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MULTIDISCIPLINARY PERSPECTIVES ON MILITARY DECEPTION

Donald C. Daniel, Katherine L. Herbig,
William Reese, Richards J. Heuer,
Theodore R. Sarbin, Paul H. Moose,
Ronald G. Sherwin

May 1980

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This report was prepared by:

Donald C. Daniel

Donald C. Daniel
Associate Professor of
National Security Affairs

Katherine L. Herbig

Katherine L. Herbig
Assistant Professor of
National Security Affairs

Reviewed by:

Patrick J. Parker
Chairman, Department of
National Security Affairs

Released by:

William M. Tolles

William M. Tolles
Dean of Research

Unclassified

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being deceived. Feedback is identified as a key element in successful deception. Communications theory, game theory, and systems theory are applied to deception to clarify the elements of a theory of deception. Recommendations for countering deception and for further research in the area are made.

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MULTIDISCIPLINARY PERSPECTIVES ON
STRATEGIC DECEPTION

by

Donald C. Daniel
Katherine L. Herbig
William Reese
Richards J. Heuer
Theodore R. Sarbin
Paul Moose
Ronald G. Sherwin

of the

United States Naval Postgraduate School
Monterey, California

May 1980

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PREFACE

This report comprises the results of research by the core members of the Deception Research Group conducted at the Naval Postgraduate School during 1979. This group began to meet regularly in January, 1979 to share ideas and develop strategies for doing basic research on deception, a problem which we felt would be studied most efficiently from a number of perspectives simultaneously. In order to focus its efforts, the group decided to study military deception rather than the related but more amorphous political or diplomatic deception, and to concentrate on the strategic rather than the tactical level.

Through reading, discussions, and the presentation of working papers by members of the group, a body of hypotheses and assumptions evolved which set boundaries for the problem to be worked. Individually or in collaboration, the investigators then developed research projects which applied the methods from their academic disciplines. Our intentions in this group research effort were twofold: to advance our understanding of military strategic deception, and to test the potential for increasing the relevance and comprehensiveness of research by examining a complex problem in a multidisciplinary way.

SOCIAL SCIENCE PERSPECTIVES ON DECEPTION

Donald C. Daniel and Katherine L. Herbig

The four papers in this section analyze strategic deception from the perspectives of history, political science, psychology, and organization theory. The authors agree that investigation of military deception should move beyond the describing of incidents (many such descriptions now exist), to comparison and generalization. In an effort to begin devising theories of deception, they have examined examples from the recent past informed by various insights into human behavior from the social sciences.

The introductory essay considers the issue in broad terms. It is conceived as an analytical survey, based on historical evidence, which formulates concepts useful for thinking further about deception. To define their subject rigorously the authors differentiate three distinct but interrelated levels of meaning within the concept "deception." They then distinguish two variants of deception which differ in their effects on a target. Using these basic concepts, the essay considers how military deceptions typically work, and what factors condition how likely and how successful they will be. The essay reaches and attempts to resolve a seemingly paradoxical conclusion: although deceivers face many uncontrollable contingencies which threaten their plans, deceptions almost always result in advantages for those who attempt them. How a device which would seem so delicate can produce such robust effects is partly explained in terms of the constraints and motivations of each side inherent in situations of conflict.

Why deceptions usually succeed is addressed again in the second essay with psychological evidence on cognitive and perceptual biases in

human judgment. By playing on these biases deceivers can take advantage of their adversary's predictable limitations. The author holds, for example, that preconceptions so strongly influence what people perceive that deceptions which exploit preconceptions are extremely difficult to escape. This is so even if the victim is alerted to the possibility of deception; despite his suspicions he will still tend to favor his initial hypotheses, to believe data that are consistent over those which are complete, and to follow analogies which are familiar, not necessarily those which are most accurate. Among its conclusions the essay suggests that mechanisms to increase analysts' openness to new, discrepant information are necessary to counter deception.

Countering deception is the focus of the third essay, which proposes a new intellectual strategy to detect and avoid being deceived. Here the purpose of deception is seen to be preventing the prediction of one's true intentions by an adversary. The author postulates that strategic deceptions are so complex, distinctive, and far-reaching in their results that they constitute unique events. The method of prediction typical in social science, statistical probability derived from many instances of the same type, does not work for unique events. Instead, the author proposes a prediction method based on a "principle of narration." This he derives from the observed human tendency to automatically construct narratives which causally link discrete stimuli and create meanings. If persons gifted with "acumen," i.e., empathetic skill, analyze possible deceptive information for its coherence into a logical, credible plot, the author predicts greater success at identifying deception than with the current statistical methods.

The fourth essay reinforces the view that strategic deceptions are not a subject which provides data ideal for social scientific methods.

The author considers various ways of studying how deception might be accomplished using the characteristics of organizations as the point of entry. The typical target of a strategic deception is not an individual, but an intelligence organization which in turn influences a group of decision-makers. The author asks two questions of his material: how does the fact that the target is an organization lend itself to deception, and how can the organization counter deception? He applies four current theories from organizational literature: interaction networks, communications, information processing, and situational context. Each theory is found to contribute clues about which factors are likely to prove important, but all demand levels of empirical data deemed too rigorous to permit their literal application to the deception problem.

Thus although approaches from social science used in these four essays have whittled down incongruities, sharpened concepts, and identified patterns in masses of details, a streak of unpredictability eludes theories of deception thus far. Whether it depends on the psychological qualities of individuals, the complexities of the organizations they create, or the uniqueness of events like strategic deceptions, this unpredictability tantalizes those who would explain it.

PROPOSITIONS ON MILITARY DECEPTION

Donald C. Daniel and Katherine L. Herbig

Military deception is an aspect of strategy and tactics which is often used but seldom acknowledged even long after a conflict has ended. The United States and Britain, for example, have only in the last few years declassified files on their World War II deception activities. Historians and military analysts have begun to reassess the war in light of these new materials,¹ but, with the exception of pioneering work by Barton Whaley and William R. Harris,² there are as yet few systematic investigations of this topic which would further development of theory.

We have studied military deceptions of the recent past, and we wish in this paper to present concepts and propositions which would serve as a basis for formulating a theory of deception. Our analysis is divided into five sections dealing with the nature of deception, its variants, its process, factors conditioning its likelihood, and factors conditioning its success. We are primarily concerned with strategic as opposed to tactical-level deceptions. The former affect the outcome of wars or campaigns, the latter the outcome of battles or small engagements. While there are differences between both, we believe most of our conclusions apply to deceptions at either level, and in a few instances we have used tactical examples where they seemed especially apt.

THE NATURE OF DECEPTION

In our view deception is the deliberate misrepresentation of reality done to gain a competitive advantage. It will aid our

elaboration of this definition if the reader refers to Figure 1, which illustrates how the broad concept of deception encompasses several subsidiary ideas.

At the figure's core is cover, the military term for secret-keeping and camouflage. Cover embodies deception's negative side, i.e., a keeping of secrets by negating access to or withholding information. Cover is at the center of deception because, no matter what his other goals, a deceiver wishes to protect the existence of some truth, be it knowledge of an already existing reality, (e.g. the capabilities of a weapon) or an intended reality (such as the scenario for the weapon's use).

The concept "lying" encompasses that of "cover." To lie is also to withhold information, but it is something more as well: a liar acts to deflect his victim away from the truth, and thus lying highlights deception's positive side. Liars create and perpetrate falsities and seek to fasten a victim's attention to them. In the narrow sense, to lie simply means making an untrue statement, but in a broader sense it can also involve manipulating the context surrounding the statement in order to enhance its veracity.³ This is what we mean by artifice, an important element of nearly all strategic deceptions.

Just as lying subsumes cover, so does deception subsume lying in both of its senses. Although the terms are often used interchangeably, deception and lying are not exact synonyms. Lying looks primarily to one side of the interaction between a liar and his audience. It stresses the actions of the teller of falsehoods. Deception is a term of wider scope because it also stresses the reactions of the receiver of those falsehoods. Someone whose false tale is not believed is still a liar,

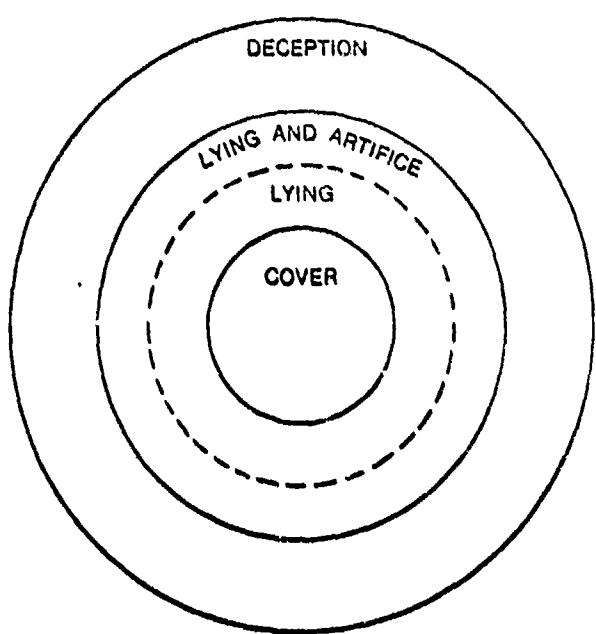


Figure 1
Deception's Subsidiary Concepts

but he has not deceived. One does not fail at lying because the audience is not convinced, but one does fail at deception if the audience does not believe the lie. Eventually almost all deceptions are exposed as events unfold, but the trick for the deceiver is to insure his lies are accepted long enough to benefit him.

The question of benefits is important because they are a necessary ingredient of deception as we see it. In our view, to be labeled deception an act must be done to gain a competitive advantage. This means, in effect, that there are three goals in any deception. The immediate aim is to condition a target's beliefs; the intermediate aim is to influence his actions; and the ultimate aim is for the deceiver to benefit from the target's actions. Deceptions are often credited with success when only the first goal is achieved, but to evaluate the actual impact deception has on the course of events, its success should properly be measured against the third goal.

TWO VARIANTS OF DECEPTION

We distinguish two variants of deception which produce somewhat different effects and operate in different ways. The less elegant variety, termed "ambiguity-increasing" or "A-type," confuses a target in order that he be unsure as to what to believe. It seeks to compound the uncertainties confronting any state's attempt to determine its adversary's wartime intentions. Contradictory indicators, missing data, fast-moving events, time-lags between data-collection and analysis, chance--all inhibit accurate intelligence assessments.⁴ Intelligence analysts work on the assumption, however, that as an adversary moves toward his true

operational goal, his preparations to do so will serve as tip-offs clarifying his intent. What A-type deceptions seek to insure is that the level of ambiguity always remains high enough to protect the secret of the actual operation.

In order to have an impact, A-type deceptions require that the deceiver's lies be plausible enough and consequential enough to the target's well-being that he cannot ignore them. Hoping to reduce uncertainty by awaiting additional information, a target may delay decision, thereby giving the deceiver wider latitude to marshal resources and take or retain the initiative. If the deceiver can insure that the situation remains ambiguous, then the target may be forced to spread resources thinly in order to cover all important contingencies. He thereby reduces the resistance the deceiver can expect at any one point.

Plan Bodyguard is a familiar World War II example containing numerous A-type deceptions. In support of the Normandy invasion, one of the plan's main goals was to prevent the Germans from shifting their forces from other European fronts to reinforce the Channel coast. The deceivers proposed to meet this challenge by mounting a coordinated series of deceptive invasion threats to Scandinavia, western and southern France, Italy, and in the eastern Mediterranean.⁵ Some threats proved more plausible than others to the Germans but the multiple threats did increase ambiguity. Hitler and his generals were forced to consider a much greater range of possibilities than just the obvious assault across the English Channel, and this contributed to their holding in Norway and the Balkans forces better needed in France.⁶

Plan Barclay, the deception plan for the 1943 invasion of Sicily, intended to generate ambiguity about the timing of impending action

as well as its location. The British raised the specter of invading plausible Mediterranean targets other than Sicily and then simulated two laborious postponements of the fake invasions. Subsequent German testimony suggests there was confusion about both where and when to expect an attack.⁷

In contrast to deceptions increasing ambiguity, there is a second more complicated category which we label the "misleading" or "M-type." They reduce ambiguity by building up the attractiveness of one wrong alternative.⁸ They cause a target to concentrate his operational resources on a single contingency, thereby maximizing the deceiver's chances for prevailing in all others.

A striking example of an M-type deception is Barbarossa, the German campaign to mislead Stalin and achieve surprise in their attack of 22 June 1941. By making their build-up along the Russian border appear to be an exercise linked to the invasion of Britain, the Germans created a plausible explanation for preparations which could not be hidden. The deception also built on Stalin's expectation that Germany would never attack Russia without first issuing an ultimatum. This "ultimatum stratagem," according to Whaley, "served to eliminate ambiguity, making Stalin quite certain, very decisive, and wrong."⁹ The overwhelming surprise achieved against the Russian defenses was a measure of how thoroughly Stalin had been misled.

Fortitude South is another well-known example. The Allies sought to portray the Normandy landings as preliminary to a much larger invasion at Pas de Calais. They did this by simulating troop concentrations in southeast England and orchestrating a symphony of agent's reports, rumors, and aerial bombing. Miscalculating badly, the Germans

fatally postponed reinforcing the Normandy front. For a remarkable six weeks after D-Day, powerful Wehrmacht and Waffen SS forces remained in the Calais area preparing to repel an invasion which was never intended.¹⁰

Although the two variants of deception, M-type and A-type, are conceptually distinct and can be initiated with different intentions in the deceiver's mind, in practice their effects often coexist or shade into one another as the deception evolves. In the latter case the direction of change generally appears to be from M-type to A-type. Deceptions planned to mislead a target into choosing one possibility may degenerate and instead increase ambiguity if the target resists or postpones making the choice the deceiver intends.

How one categorizes a particular deception partly depends on the perspective one takes. The variants can differ whether viewed from the deceiver's intentions or from the effect they ultimately have on the target. Strategic deceptions seem to be most often intended to mislead, since this form offers the largest potential payoff to the deceiver. However, one would expect pure misleading deceptions to obtain rarely because they require a target to be so sure of a false alternative that he stakes all on preparing for it. Prudent commanders seldom do this. They develop contingency preparations for other conceivable alternatives. Thus it may be most useful to consider the outcomes of the two variants as a continuum between convinced misdirection at the one pole and utter confusion, in which all looks equally likely, at the other. The Barbarossa deception seems to be an unusually strong example of misdirection, while immediately before D-Day Fortitude South would fall perhaps three-fourths of the way toward the misdirection pole. In the latter case, although quite sure the main attack would come at Calais,

Hitler and most German generals continued to consider a range of invasion site possibilities along the channel. German forces, though concentrated at Calais, were disposed from Belgium to Cherbourg to cover these possibilities.¹¹

THE PROCESS OF DECEPTION

In order to understand the process of deception, it is necessary to differentiate the categories of actors typically found on both sides of the interaction. Figure 2 adapts the traditional systems model to illustrate these categories and their relationships.

The deceiver's side consists of decision-makers, planners, and implementers. Regardless of who had the inspiration, a deception does not begin until a decision-maker agrees to it. Wide-ranging strategic deceptions such as Bodyguard are cleared only by the highest authorities. Having many responsibilities, they are unable to devote much time to planning and implementation. During World War II such tasks were assigned to small cadres in intelligence-gathering and covert action organizations as well as military staffs.¹² These groups were often not a normal part of the civilian or military bureaucracy but rather, like the famous London Controlling Section, were specially formed during the war and disbanded or severely cut back at its conclusion. On an as-needed basis, implementers temporarily coopted regular military personnel who generated false radio traffic, set up deceptive camouflage, simulated large troop movements or encampments and the like.¹³ National political leaders, high level diplomats, civil servants, businessmen, and news reporters also often played starring roles in strategic deceptions.

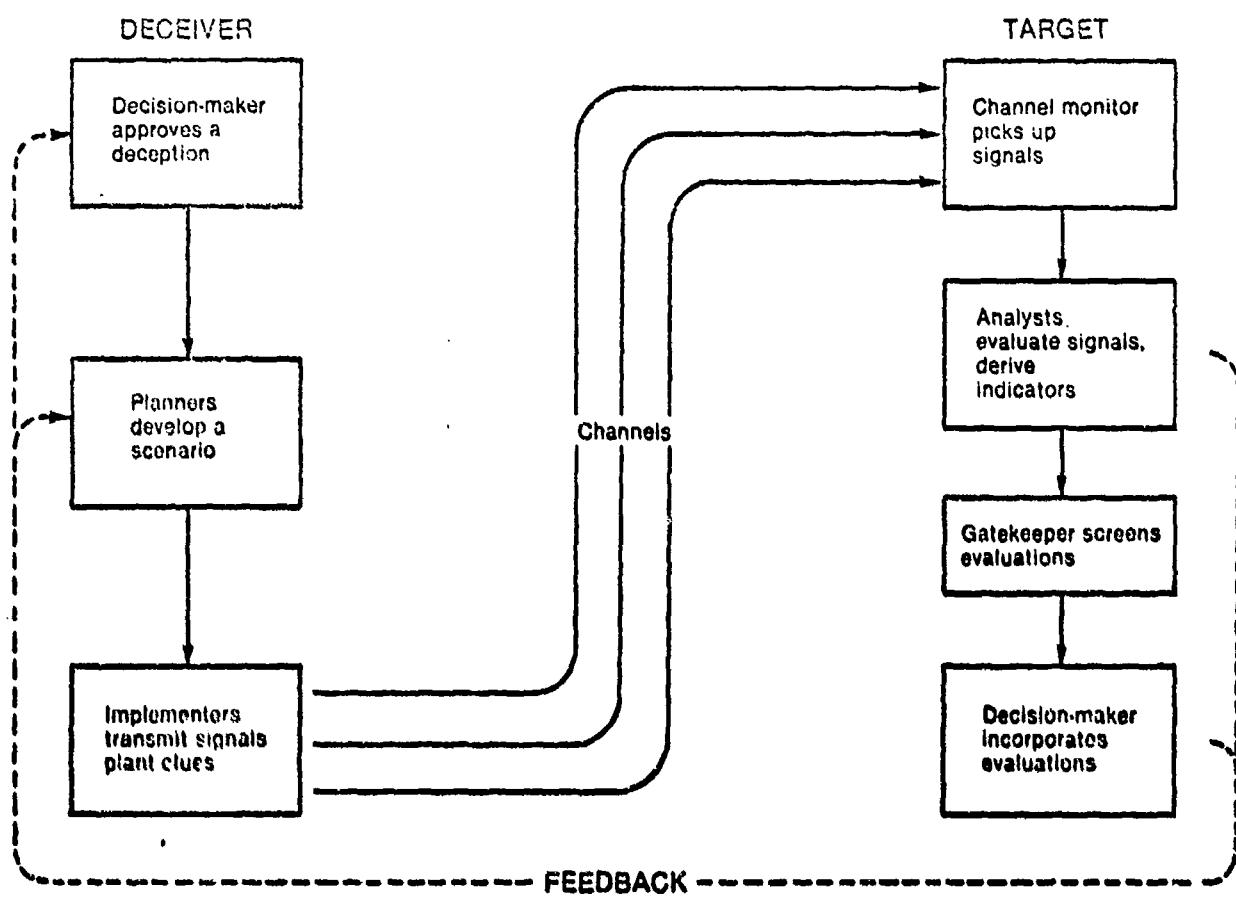


Figure 2
The Process of Deception

The initial target of a military deception is usually a state's intelligence organization. It consists of channel monitors who seek out and collect information and analysts who coordinate and evaluate it. Gatekeepers within intelligence agencies and command staffs screen the information and analyses, and determine what is actually forwarded to civilian or military authorities--the ultimate deception targets. Presumably relying on information received, these leaders make the strategic or tactical decisions which the deceivers seek to influence.

It is the links between deceivers and targets which makes deception possible. Designated as "channels" in Figure 2, their variety is unlimited. A channel could be a foreign newspaper monitored by the target, his reconnaissance satellites, electronic intercept systems, diplomats, or spies. Through these channels the deceiver transmits signals, planted clues or pieces of evidence, which it is hoped the target will shape into indicators of the deceiver's intent or capabilities. A signal may be a paragraph in a news article on the activities of a general, a reduction in the level of military radio traffic, or a photo of ships offloading cargo. Taken together, e.g., these may indicate to a target that an expected amphibious attack will not soon occur since the general expected to lead it is away on other business, radio traffic is too sparse to indicate increasing activity, and ships preparing to carry out an impending attack usually on-load rather than off-load goods.

A deception expert has compared his task of formulating and transmitting signals to the work of a playwright. Each devises a story and

seeks to put it across to an audience by means of "scenery, props, costumes, principals, extras, dialogue, and sound effects."¹⁴ In order to have the story unfold in the intended manner, each must coordinate the timing, tempo, and content of his signals.

Though similar in many ways, the problems facing the military deceiver are more acute than those of the playwright. One reason is that the deceiver cannot assume that his audience is attending only to his production. He must accept that high level target leaders have numerous responsibilities forcing them to divide their attention among numerous "shows". He must also accept that what a target knows about any situation is not restricted to what the deceiver is telling him. In other words, the deceiver is putting on a show but he does not fully control the number of actors on stage or all the lines being said. Few targets can be expected to be as accommodating as Stalin during the Barbarossa deception. Refusing to consider the possibility of a German attack, he threatened to silence forever one of his agents correctly predicting it!¹⁵

A second reason why the deceiver's problems are more acute is that his production is being staged at some remove from his audience. At times it may only dimly perceive what is going on. Hence, the deceiver must be very sensitive to the prospect that some of his signals may not make it through to the target in the intended manner and that, if they do, they may not be interpreted as he would wish. Figures 3 and 4 depict the difficulties he faces. Figure 3 illustrates the story of a deception as a puzzle made up of eight signals, the puzzle's pieces. The deceiver desires the target to receive each of them, interpret them as indicators, and fit them together into a story,

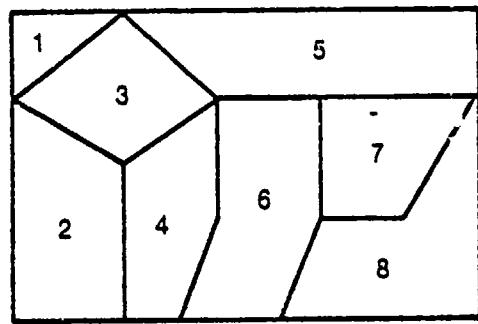


Figure 3
A Deception Puzzle

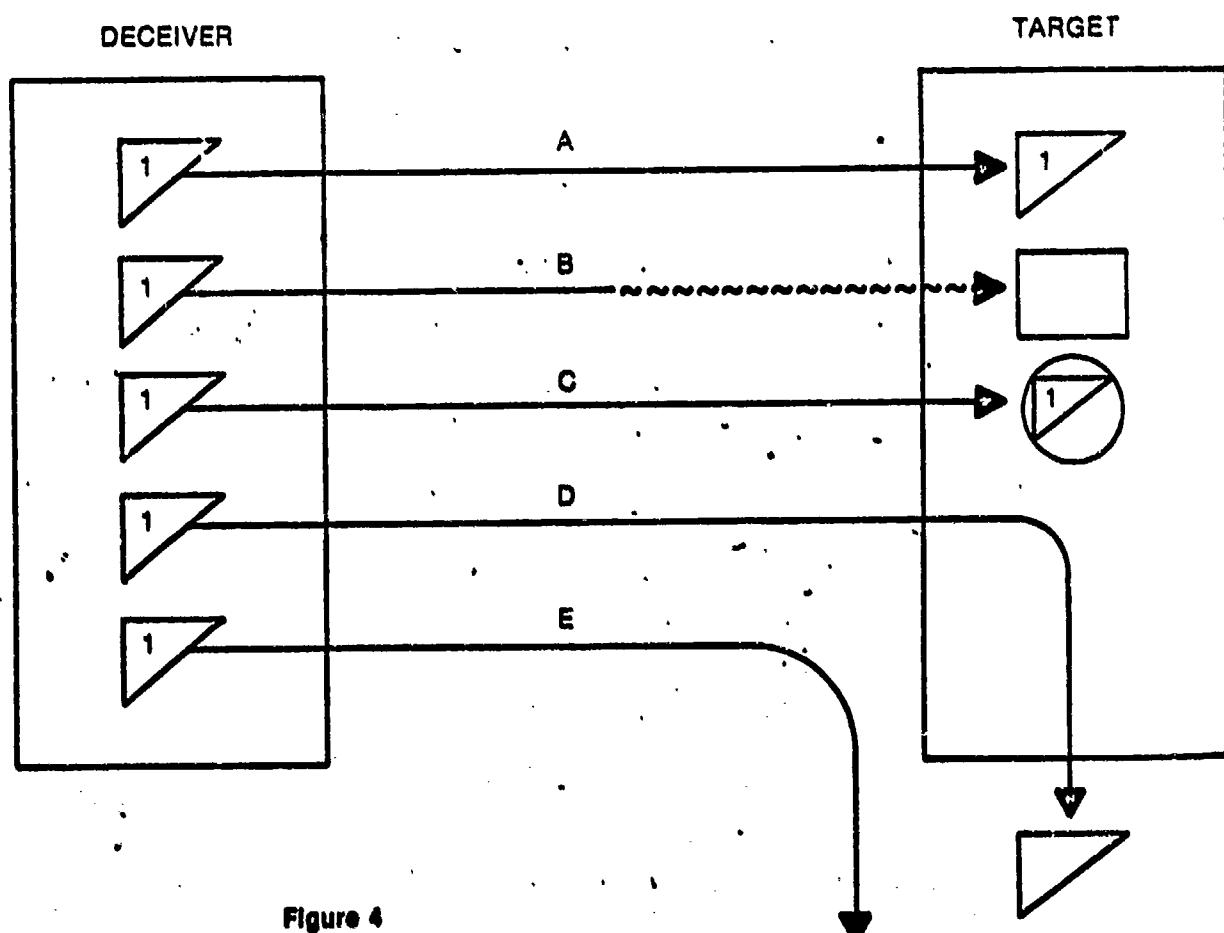


Figure 4
Possibilities During the Transmitting
and Interpreting of a Signal

the picture on the puzzle's face. Figure 4 illustrates what can happen to the signals during transmission and interpretation. The triangles on the deceiver's side reproduce signal number 1 in the top left corner of Figure 3. If the target has properly received and interpreted the signal, an identical triangle appears on his side. This is possibility A of Figure 4. It represents the deceiver's fondest hope. In contrast, possibility B is a signal which was garbled or modified in the channel after it left the deceiver. Hence the target received a signal different from that which was transmitted (symbolized by the square). C and D represent signals monitored intact, but the former was misinterpreted (shown as the triangle within a circle) and the latter dismissed (illustrated as a triangle thrown out from the target's side). Finally, E is a signal sent but never received by the target; perhaps the deceiver was inept in its transmission, or the target happened not to be "listening," or chance in its many forms intervened to deflect the signal away.

One would think from the above discussion of a deceiver's problems that deceptions should seldom succeed. In fact our research leads us to conclude that the opposite is true. Targets, after all, are normally searching eagerly for indicators of enemy intent and, if the enemy is a deceiver, he is just as eager to provide his foe with indicators, albeit false ones. Hence it should not be surprising that, if properly transmitted and designed to be highly salient to a target's concerns, many signals reach the target largely unscathed. Unless his intelligence organization is inept, they are monitored and evaluated for their significance as indicators, and their underlying story (or a variant of it) usually rises to the surface. In the end

the story may be dismissed, but only after it has at least been considered.

Finally, the direction of signals in a deception is not necessarily always from deceiver to target. There may be return channels from the latter to the former. This is the feedback loop shown in Figure 2. The deceiver can thereby modulate his activities if time allows. In a successful deception, of course, the target is not aware that his actions and statements constitute feedback for a deceiver. Should the target realize it, the stage is set for a further permutation in the deception process, entrapment of the deceiver by his victim. By using the feedback channels to send deceptive signals to his enemy, the target becomes the deceiver and the deception channels become feedback for this new layer of deception.

FACTORS INFLUENCING THE LIKELIHOOD OF DECEPTION

Two groups of factors influence the likelihood of military deception: those which characterize situations confronting an actor and those which actors bring to a situation by virtue of previous conditioning or personal predilection. The factors may operate independently or in combination with one another. It is difficult to establish a priori which group is more important, but the second set probably has greater impact.

Of the first group, high stakes situations can certainly influence willingness to deceive. When outcomes are critical, adversaries are encouraged to make use of every capability, every advantage, to insure victory or stave off defeat.¹⁶

Resort to deception can be particularly compelling if decision-makers are not fully confident of a situation's outcome because of their own

military weaknesses. Desiring to compensate for them, they seek through some ruse to induce an enemy to lower his guard, dilute his strength, or concentrate his forces on the wrong objective. Plans Bodyguard and Barclay, e.g., both reflected the concern that, until a beachhead is secured, amphibious landings are highly vulnerable to being pushed back into the sea. From the attacker's perspective, it is thus imperative to assure that the defender's response capability be as limited as possible. Weaker in mechanized forces, Hitler similarly wanted to limit Allied response to Case Yellow, the May 1940 push into France. He convinced the Allies that his main thrust would be through Holland and Belgium. While the British and French massed in that direction, the Wehrmacht's primary offensive was actually far to the south at Sedan. It then turned toward the channel encircling the cream of the Allied armies. The Dunkirk evacuation meant that the bulk of these would fight again, but for France the war was lost.¹⁷

Even when optimistic of the outcome of a situation, an actor may be attracted to deception as one way to lower costs. The wish to avoid being viewed as an aggressor has inspired many a nation to fabricate evidence that its victim actually fired the first shot. The wish to avoid human or material losses has resulted in schemes such as the British plan in 1943 to protect their bombers attacking Peenemunde. Though confident this German rocket facility could be destroyed, the British sought to minimize their own casualties. They succeeded in deflecting German fighters from their bomber streams by convincing the enemy's air defense that Berlin was the target instead.¹⁸

Situations characterized by uncertainty can also induce deception. In those circumstances, actors often seek to mislead or confuse in order to keep their options open and to test the reaction to alternative policies.

A state undecided as to whether to attack another, for instance, may still wish to be ready to do so. This was the case prior to the last-minute Soviet decision to invade Czechoslovakia. Having its troops "exercise" in border areas for the greater part of the summer allowed the USSR to proceed with preparations for an invasion while not openly committing itself to this step. It also allowed the Soviets to save face if they decided not to attack. After all, the Czechs might have backed down, making attack unnecessary, or they might have rallied the overwhelming support of the world community, making the invasion option even more unattractive.¹⁹

In any of these situations, not all states or individuals would resort to deception. Actors bring their own conditioned responses, their own predilections, to the problems they face. We see at least five factors possibly at play here.

First, there may be "deception styles" which vary from culture to culture that would account for the differences in when and how nations use deception. The intriguing thought that some societies' values or expected modes of personal interaction condition individuals to understand and succeed at deception is to our knowledge largely unexplored.

Scott Boorman in his work on the Chinese does suggest that deception has traditionally been part of Chinese military strategy because it is so available in the cultural norms. The Chinese assume interpersonal deception will and should occur constantly between individuals as a means of protecting face by deflecting too-threatening truths.²⁰ Since at least the doctrines of Sun Tzu in the fourth century B.C., the Chinese have long prized victories gained by undermining through deception an adversary's desire or ability to give battle.²¹ The potential link between a culture's expectation for interpersonal truthfulness or

deceptiveness and that culture's resort to military deception is not yet well formed, but it remains suggestive. For example, does a country like the United States, with a culture noted for the openness, even the naivete of its interpersonal interactions, find strategic deception uncongenial to its habitual ways of thinking?²²

It is conceivable that by studying cultural norms we may learn to predict how nations will employ deception in military contexts. Harris begins such an analysis by comparing national patterns in the deceptive practices of the Soviets and the Chinese. He describes the Soviets' use of the "false war scare" to overawe opponents, their penchant for "dis-information," and their efforts to induce overestimation of their military capabilities. This contrasts with the Chinese preference for the "deep lure," the multiple stratagem, and the anticipation of the enemy's intentions through acumen.²³ His work suggests that by expanding systematic comparison of national "deception styles," we may isolate patterns that could alert counter-deception analysts sooner to the deceptive ploys of a particular culture.

Herbert Goldhamer suggests a second conditioning factor. He contends that deception may be more common in states where political leaders take a strong, central role in military decision. His argument implies that politics either attracts individuals prone to deception or conditions individuals to practice it. As a corollary to his general argument, he adds that a tendency to deceive is particularly prevalent in dictatorships and authoritarian regimes. He reasons that the "secrecy and total control available [in these governments], and the reduced inhibitions that accompany such exercise of power, facilitate and provide incentives for the exercise of craft, cunning, and deception."²⁴

Paralleling Goldhamer's perspective are two closely related factors. One is the bureaucratic imperative that organizations trained for particular tasks will seek to perform them. The other is the psychological trait that people tend to think in terms of what is available or familiar to them.²⁵ These phenomena suggest that military deception is likely to occur if a nation maintains an apparatus to plan and organize deception, or if its military preserves, passes on, or at least debates a doctrine for deception. Conversely, nations having no such apparatus or doctrine, or which allow them to atrophy, must overcome the inertia involved in creating or revivifying them--a situation characteristic of America's early strategic deception efforts in World War Two.

Finally, there is the issue of a person's own predilection to deception. It is clear that even within the same cultural or organizational setting, individuals differ in this regard. Some leaders relish deception, others put up with it, still others resist it. Why this is so remains largely unexplored. Whaley searched his historical data for evidence of a "deceptive personality type," a group of attributes or experiences that would account for these differences, but could find none.²⁶ At present we must be content to observe that personal reactions to deception are at least self-consistent. That is, a commander who has appreciated and relied on deception in the past is likely to do so again. Churchill was an early proponent of deception in World War I and encouraged its elaboration again twenty years later; Douglas MacArthur used serial deceptions in his campaign across the Pacific, and succeeded with it again at Inch'on. In following the good advice to "know thy enemy," a nation might be well served to evaluate its opponent's experience with deception.

FACTORS CONDITIONING THE SUCCESS OF DECEPTION

The success of a deception can be evaluated in a variety of ways, none of them precise. One can consider how well the deception was implemented: were the activities outlined in the scenario carried out according to plan? Even at this narrow level defining success must be relative, since one characteristic of the most effective deceptions is that they adapt to changing circumstances and thus depart from the original plan. To evaluate the plan itself one must sort out the impact of deception activities on the target from the other influences affecting him. First, did he adopt the false understanding the deceiver intended? And secondly, did he act on the basis of that understanding in ways contrary to his true interest? Usually it is impossible to recover precisely the relative weight deception had in tipping the scales of a decision. As in most problems of historical evaluation, evidence on the priorities assigned in a decision is often lacking. Unfortunately for students of strategic deception, what seems to us as the two most common types of deceptions are also the most intractable to evaluate. Misleading deceptions which reinforce what a target believes, and ambiguity-increasing deceptions which multiply the options a target must consider, both build on what already exists. Would the target have continued undisturbed in his (false) expectations without the deceiver's reinforcement? Would his existing ambiguity have been enough to cause delay and confusion without the deceiver's adding more? One cannot know for sure.

A higher level of evaluation asks one to consider what impact the target's adverse actions, prompted to some degree by deception, had on the outcome of the encounter itself. What military and political

consequences flowed from it? For example, what degree of importance should we assign to deception in the results of the invasion of Sicily or Normandy compared to force levels, or weaponry, or generalship? Would the English have bounced back more quickly from the Blitz had they escaped the delusion that Hitler's Operation Sea Lion, a deception which called for an invasion of Britain, was true? Would the Israelis have rested secure in their (false) assessment of Arab intentions to attack in 1973 even without the deceptive signals of calm planted for their benefit?²⁷ Perhaps, but since deception did play a role in these cases, historians who will wrestle with them cannot escape the delicate task of reaching some tentative evaluation of it.

Two recently declassified documents provide an interesting starting point for discussing factors conditioning success. They reveal that experienced deceivers on either side of the conflict during the Second World War arrived at similar conclusions about how to succeed at deception. Comparing these two examples of "lessons learned," one British, one German, helps focus on the basic requirements for success.

In September 1944, a deception planner working with the Supreme Headquarters Allied Expeditionary Forces (SHAEF), produced a top-secret report for the Allies on cover and deception procedures. His conclusions reflected "four years of successful [deception] operations by the British." Six years later General Hans von Grieffenberg, a German infantry officer, wrote a review of German experience with cover and deception.²⁸ Both of these documents are intriguing, and there is considerable agreement between them.

Since the authors were writing to instruct future deception planners in "the basics," they prescribed formulae for success in simple terms,

avoiding qualifying or conditional statements. We will use their prescriptions as a foil against which to develop and, in some cases, elaborate our thoughts on successful deceptions. The documents provide us with three useful categories: 1) secrecy, organization and coordination; 2) plausibility and confirmation; and 3) adaptability. We add a fourth, the predispositions of the target, and a fifth, factors in the strategic situation.

Secrecy, Organization and Coordination

Both the SHAEF planner and Von Gieffenberg strongly agree that "knowledge that cover and deception is [sic] being employed must be denied the enemy." (Emphasis in all quotes in original.) "If the strictest secrecy is not observed," says Von Gieffenberg, "all deception projects . . . are condemned to failure from the very start." Deceiving one's own troops for the sake of security, he adds, is a normal byproduct of deception.

Consistent with these admonitions, both individuals argue that deception must be well-organized and well-coordinated, else leaks may occur and the deception unravel. They are well-organized when there is "detailed preparation" where even "seeming trifles are not overlooked." They are well-coordinated when directed from one central point--that being the highest headquarters controlling operational forces directly benefitting from the deception.

In one sense these prescriptions are obvious. By definition, secrecy is inherent to deception, and organization and coordination are inherent to the success of any but the most simple endeavors. Yet total security is an elusive, usually unachievable goal even in the

best organized and coordinated operations. Close study of preparations for strategic operations such as the attack on Pearl Harbor or the invasion of Russia in 1941 show numerous warnings and indications slipping through Draconian security efforts.²⁹ The relationships between deception and security would seem to be more complex than our experts acknowledge.

There are two levels of security involved in a deception. One tries to protect the truth about what a side intends to do in an impending operation. For example, if the operational plan calls for landings at Dakar, and the related deception plans try to make it appear there will be landings on the coast of Norway or in the Middle East instead, trying to keep the actual intentions about Dakar secret is obviously important. The second level of security tries to protect the truth about the existence of the deception itself, to prevent the target's certainty that some identified possibilities are deceptive and may thus be safely ruled out.

Breaches of security at either level, commonly referred to as leaks, need not be fatal to deception's success. Some leaks may not catch the target's attention, and if they do, may only increase his ambiguity. A target's predispositions may cause other leaks to be ignored or misinterpreted as to their true significance. For example, Whaley's study of the Barbarossa campaign shows how "leaky" the strict German security became as the invasion approached; without damaging deception or the surprise achieved, literally dozens of clues of German intentions reached the Russians. Indeed, since Stalin apparently explained away all warnings as provocation by the Allies, here leaks actually furthered the deception.³⁰

There is reason to argue that the "bigger" the leak, the less likely the target will believe it since it seems too good to be true. One survey of ten such "windfalls" reaching an adversary, half of them true and half deceptive plants, found that all deceptive leaks were accepted, perhaps because the deceivers made sure it was plausible that such valuable information was lost. Four of the five genuine windfalls were discounted as too blatant to be anything but plants.³¹ The windfall cases illustrate that, even when a target suspects deception, his position is not necessarily improved. He must still decide which of two or more alternative scenarios is the truth.

Since leaks are an inevitable concomitant of strategic deceptions and often result from mistakes in the organization and coordination our experts from World War II recommend, we suggest that a more powerful predictor of deception success is plausibility.

Plausibility and Confirmation of the Lie

The SHAEF and Von Griefenberg documents present a number of principles to the effect that the lie must be plausible. They also imply that it must be serious; that is, the deceiver's scenario must not only be one which could conceivably happen, but also one which seems ominous enough, and likely enough, to provoke the target to forestall it. To achieve this, they recommend that the lie be woven into a skein of truth and confirmed by more than one source. As Von Griefenberg put it, the deception "must be brought into harmony with the overall situation." His SHAEF counterpart insisted that an "enemy will not react to information from a single source. He will react only on information from one source confirmed by at least one other."

Our work leads us to agree with the above prepositions. As we see it, a very important factor in establishing plausibility is the deceiver's capability, as perceived by the target, to do what the lie commits him to do. A deception is doomed to fail if a target is too highly skeptical about the deceiver's capabilities. During the summer and fall of 1943, for example, the Allies tried a series of strategic deceptions, with the overall code name Cockade, to simulate a cross-channel invasion of France for early September. German response proved disappointing: the Luftwaffe did not rise to the bait and avoided the needless and costly air battles the deceivers had hoped their false invasion would provoke. The Wehrmacht did not reinforce the French coast to brace for invasion; the slow drainage of German forces to the Eastern front continued. German intelligence had felt that "the resources available in GREAT BRITAIN are insufficient to permit any attempt to invade the continent this summer."³² The British learned a lesson which they applied the following year in Fortitude: while they only had 35 to 40 divisions available for a cross-channel invasion, they built up a notional force of twice that number to convince the Germans that they really could strike at Calais.³³

A lie is made more plausible when it has been confirmed by a variety of credible sources. The need for confirmation is a quality most people develop from their experience with the complexities of reality: truth, albeit partial, is seen to emerge from numerous points, some of them contradictory, some veiled, some obvious. The usual targets of deceptions, intelligence organizations, accentuate this issue by demanding that all claims be confirmed and evidence evaluated and ranked according to its estimated reliability. The number of sources confirming a fact and the credibility of the sources are both important, and

their effects interact.

Given the expectation that an array of mutually supportive clues is likely to be true, the more channels of information a deceiver can manipulate to send signals which reinforce one another, the more credible his deception. Conversely, if he can control most of the target's channels of information, such as his double agents, the deceiver lessens his adversary's access to disconfirming evidence.³⁴ The latter is often as important for a deception's success as the former, since the best-orchestrated chorus of many reinforcing clues will be questioned if even a few voices sing off-key loud enough. In the Mediterranean and in northern Africa, for example, the British deception teams could never count on complete control over German channels of information. There independent German agents persisted, sending back observations and hearsay irrespective of the British deceivers. This made deception more difficult, less precise, and more unpredictable than was achieved in England, where the island's isolation, the turning of the whole German spy network, and the decline of German air reconnaissance allowed almost complete control.³⁵

Credibility of sources can be as important as their number. Intelligence analysts rank information by how credible its source is; they pay most attention to reliable sources, and a few of these may outweigh many questionable ones. The deceiver's knowledge of his target will shape how he establishes the credibility of the channels he controls. What seems credible to him may not seem credible to the target since cultural perceptions can intervene in this judgment, and it is the target's skepticism the deceiver must allay.

Credibility itself is a relative judgment that shifts with circumstances. When one has no better available sources, those which

do exist often seem better than an objective evaluation would warrant. The Germans placed heavy reliance on their agents in England during World War II in part because they had so few other choices. It seemed to the British who ran the double agent system that the Germans forgave their agents egregious errors rather than consider that they might have been turned.³⁶ The spymasters in Germany were paid according to how well their particular agents performed, a mercenary incentive which further undermined their skeptical evaluation of sources. On the other hand, knowing that a whole agent system could be turned, since they were doing it, did not prevent the British from being deceived by the Germans in just this way. For several years the Abwehr ran all the Allied agents in Holland using radio communications.³⁷

Knitting the deception into many strands of truth is another part of providing the target with confirmation. By meshing many of the less-critical points of a deception scenario with the real plans, a deceiver assures that the target can verify these details as they occur. As more of the elements in an evolving explanation are confirmed, the target is likely to ignore, twist, or explain away those details which do not fit, and often these are the crucial incongruities on which the deception hinges. The British deception teams learned this early in the war. Evaluating their deception efforts for Operation Torch, the invasion of North Africa, they found that their scheme to explain the build-up on Gibraltar as reinforcement for Malta rather than an invasion force "went well," while threats to more distant destinations, Norway and northern France, proved unconvincing. According to J.C. Masterman, this "underlined the obvious fact that cover stories ought to be as near the 'real thing' as was safely possible."³⁸ One deception expert estimated that deception

scenarios should be 80 to 90 percent true.³⁹ He thereby highlighted a paradoxical quality of deception. While Churchill may have correctly defined it as the protection of truth by a "bodyguard of lies," the execution of deception requires the protection of its lies by a bodyguard of truth.

Adaptability of Deception

Von Griefenberg argues that deceivers should take advantage of any opportunities which arrive by chance. Implied in his argument is the proposition that the success of deception is enhanced if the deceiver adapts to changing circumstances and unplanned events. This proposition is a logical extension of earlier statements that the lie must be plausible and woven into a skein of truth. As the truth changes, so must the deception if the lie is to remain believable. Otherwise the divergence will expose the lie.

Von Griefenberg's emphasis on unplanned opportunities is well chosen. Their "chance" nature can help make it difficult for a target to suspect that they may be part of a deception scheme. For example, Hitler achieved complete surprise in his attack on Russia in 1941 because Stalin expected to receive an ultimatum of German demands before any action was taken. Given Hitler's previous behavior before invading Czechoslovakia and Poland, this expectation was shared by many knowledgeable observers throughout the world. Yet of all the many ploys the Germans launched to deceive the Russians about their intention to attack, this ultimatum expectation, apparently the most effective deceptive clue of all, seems to have been spontaneously generated by the churning international rumor mill. Hitler then cleverly picked up and reinforced this useful fiction in his deception campaign.⁴⁰ Similarly, the Allies expected their Fortitude decep-

tion to play out quickly after the size of the Normandy invasion became clear. As the days passed and evidence mounted that the Germans held to their expectations for a second invasion at Calais, the opportunity to spin out the deception, using Patton's fictional forces as a threat, was seized and milked for nearly two months, aiding the consolidation of the Normandy beachhead.⁴¹

The ultimate asset which allows deceivers to adapt their scenarios in these ways is feedback from the target. Accurate intelligence on what the adversary is intending and how he is reacting is one of the basic goals in any competition, but for deception it has particular importance. This is because the crucial effect for which deception aims occurs in the inaccessible mind of the opponent. For his miscalculations to produce actions beneficial to the deceiver, the latter ideally should be able to monitor how his opponent's ideas are evolving in response to the deceptive clues provided by him. Feedback allows deceptions to continue for a longer time, to take advantage of unexpected interpretations or unforeseen events in the enemy camp, and to protect valuable resources by ending the ploy should the deception wear thin.

Since trusting one's feedback presents deceivers with the same evaluation problem that the target faces--is this information reliable, or part of a counter deception?--the most valuable kinds of feedback are obtained through cryptanalysis, espionage, or other covert means. Such methods can bring the deceiver into the inner sanctum of high-level adversary thinking and decisionmaking. Revelations of the British achievement in securing feedback for their deceptions through ULTRA have recently focused attention on the importance feedback can have. Decoding relevant

ULTRA messages fast enough to gain operational advantage was a "knife-edge business," as Lewin says, but as a source of insight about how Hitler and his staff were responding to deception it was unparalleled. John Bevan, "controller" of British deception, gave ULTRA full credit for enabling them to sustain their more complicated deception scenarios.⁴²

Target Predispositions

Unaccountably, neither the SHAEF nor Von Grieffenberg reports advised potential deceivers to make use of a target's predispositions, yet this factor seems undeniably significant. Certainly deceptions which slant the target's mind-set in directions he is predisposed to take have a higher probability of convincing him than those which run against the grain of his expectations and assumptions. Conventional wisdom is supported by experimental psychology on this point: the stronger his predispositions, (especially if he explicitly commits himself to them), the more a target will ignore or twist information inconsistent with them.⁴³

When an adversary knows the other's predispositions, he may well choose to do the unexpected. The deceiver's task then becomes providing clues which reinforce these predispositions while minimizing or discrediting clues which contradict them. He can assume the target will do much of this work for him, however, since experiments have repeatedly shown the strong impact of expectations on perceptions and judgment. Thus the target acts as an unwitting but cooperative victim, and the distinction between perpetrated deception and "self-deception" narrows. This is Roberta Wohlstetter's point in a recent article. She considers examples of policy makers seeing what they devoutly wished to see, rather than what was there. For example, the United States accepted the Indian government's repeated bland assurances that its nuclear research was

aimed at peaceful uses because this "transparent cover" allowed nuclear sales to continue; when the Indians then exploded a nuclear weapon, they blew away the U.S.' self-imposed blinders about India's goals.⁴⁴

Determination of an adversary's expectations may be direct or indirect, through inference. Close study of an enemy's habits of thought and preoccupations provides one means, as when the Allies repeatedly played to Hitler's known fear of a Balkan invasion. Intelligence sources provide others, such as ULTRA or the analysis of German questions to their agents in England, which revealed the patterns of their concerns.⁴⁵

Often just the indirect means of studying the strategic situation will reveal the adversary's expectations clearly enough. It was strategically almost inevitable that the Allies would eventually invade across the English channel; it was also fairly clear to both sides in 1942 that after the North African victories the next Allied target should be Sicily and the Italian Peninsula. These "realities," which are in part a reflection of the strategic doctrines available to both sides in a given period, set bounds on what can be made to seem plausible in a deception, and define what an opponent will probably be expecting to happen.

However, the case of Sicily illustrates a different problem. Here the Allies wanted to invade precisely where the Germans expected them to; (as Churchill said, "anybody but a damn' fool would know it is Sicily,") so the task for deception was to change the target's mind enough so he expected attack somewhere else, or at least at several other points instead of one.⁴⁶ This provoked the famous Mincemeat ruse using the corpse of a notional courier to plant false plans pointing to an attack on Sardinia. The windfall, when backed up with additional rumors and signs

pointing to several other targets, led to a dilution of German forces on Sicily and confusion about where and when the attack would come.⁴⁷

Experimental psychology tends to support the likelihood of Mincemeat's success. In experiments done to isolate the factors which lead someone to change his mind, results were best when subjects were confronted with a large amount of information which contradicted their expectations, and when they received this information all at once or in a short period of time.⁴⁸ The information must also be credible and salient to the problem. In our example, Hitler saw and initialed the German intelligence report on the Mincemeat courier's documents and altered his orders immediately thereafter to reflect this information.⁴⁹ He illustrates how only with a considerable and concentrated shock to his comfortable assumptions will the target consider giving them up and changing his mind in the direction the deceiver intends.

Examples of deceptions which successfully played on a target's pre-dispositions are much more numerous than those which reversed a target's expectations. This suggests that the former are the norm and the latter are exceptions. How readily one can change a target's mind seems to depend in part on the pressures his environment exerts for making decisions. Experimental psychologists suggest the seemingly paradoxical proposition that if a target can be influenced to adopt a vigilant posture, chances increase that he can be convinced to change his beliefs.⁵⁰ Why this happens requires distinguishing three emotional states associated with making important decisions.

The first of those is relaxation: an individual feels no tension because no such decision is required of him. The second is that of moderate tension, or vigilance: some tension arises from the need for a decision,

but it remains moderate as long as the individual believes he has adequate time to evaluate alternatives before deciding on one. The third state is high tension, or rigidity. Here the individual feels great stress because time seems inadequate to properly evaluate alternatives.

Psychologists argue that individuals are most apt to follow their predispositions in either the first or the third emotional states: when they are relaxed, or when they are very tense. In the first case, facing no important decision, the individual sees no disadvantage in giving heed to his predispositions. Pressed for important decisions in a hurry, on the other hand, individuals fall prey to "selective exposure," defined by Janis and Mann as an "active search and preference for supportive information and avoidance of discrepant information."⁵¹ In other words, the target sees what he consciously or subconsciously chooses to see. It is the second state of moderate tension, or vigilance, that elicits responses most likely to overcome predispositions. Vigilance is here defined as:

a discriminating and open-minded interest in both supportive and opposing messages. . . with no tendency towards selective exposure . . . [T]he vigilant decision-maker will actually prefer to obtain nonsupportive messages in order to satisfy his need for specific information about the losses he might incur.⁵²

Deceivers who need to change someone's mind should thus choose as their entry point this open-minded interest in contradictions of the vigilant decision-maker. A target confronting a potential decision with enough time can be expected to seek out, consider, and possibly accept information he would otherwise be likely to ignore or reject. A vigilant target

may still consider and then reject a deceiver's slanted evidence, but faced with either more or less pressure for a decision, he might never seriously consider it at all.

A third mode for handling a target's predispositions lies open to deceivers: instead of capitalizing on or reversing existing expectations, deceivers may wish to create certain expectations. Here the deceiver sets up the target for a future surprise by conditioning him to expect something he hadn't considered before. Often these deceptions rely on creating the comforting illusion that the deceiver follows certain standard operating procedures which the target comes to expect and therefore to disregard. When the deceiver's intended action does occur, the target misinterprets it, and does not respond appropriately or quickly enough. An example in which the British were caught napping by such a deception occurred in February 1942. Two German ships, the Scharnhorst and the Gneisenau, dashed through the English Channel undetected because British coastal radar had been systematically hoodwinked by gradually increased jamming. R.V. Jones admits that the Germans had "subtly increased the intensity of their jamming over a period so that we would get acclimated to it, without realizing that it was now so intense that our radar was almost useless."⁵³

Strategic Initiative

It is not surprising that our fifth category of factors affecting success is not to be found in the admonitions of either Von Gieffenberg or the SHAEF writer. This is because it concerns an element over which deceivers have little control: strategic initiative in war. While being on the defensive gives more urgent motives for resorting to deception,

it limits the scale of deceptions that are likely to succeed. The initiators of action are defining the nature of the encounter and thereby have the greater degree of control over it at the outset. They act; the opponents must react. This control puts the initiators in a relatively better position to succeed at deception if they attempt it.

A major advantage which the initiative confers for successful deception is time. Being able to act when it is ready, the initiating side has the luxury of using the available time to spin deception plans if it chooses to; the defenders must respond willy-nilly to the action, ready or not. Since deceptions at the strategic level demand time to work well, it is not surprising that instances of the most elaborate sort are done by the side which can take the initiative.

Realizing that the better position from which to succeed at deception is the offensive should not lead us to underrate deception by the underdog seeking to overcome disadvantages with guile. The point is that defensive deceptions are still literally disadvantaged--limited in scope and in planning time and possibly also thin in resources needed instead for battle operations. This was the context of British deceptions in World War II from 1939 through mid-1942; most of their deceptions were passive, that is, camouflage or simulation exercises to deflect German weapons from their targets. As the tide turned against the Germans late in the war their ability to deceive declined as time, resources, and information ran out.⁵⁴

CONCLUSION

Aesop wrote of a fly which sat on a chariot's axle and credited to itself the dust raised by the turning of the wheels. R.F. Hesketh referred to this fable in a now declassified report wherein he described the work of his deception group in 1943-44 as it implemented Fortitude. Hesketh's point was that he was careful in his analysis not to over-value the significance of his work to the Allied victory at Normandy. "It is always tempting," he wrote, "for those who set out to deceive and who see their objects fulfilled, to claim credit for their attainment when, in fact, the motive force lay in another quarter."⁵⁵

We applaud Hesketh's candor and would add that all deception analysts need to guard against over-crediting deception's significance. The temptation to do so is alluring because deception does seem to be such a powerful tool. Fortitude and other cases illustrate that the advantage in any properly executed scheme invariably belongs to the deceiver. After all, he knows what the truth is, and he can assume his adversary will search for its indicators. As a result, the deceiver can expect the victim to pick up some of the signals intended to mislead or confuse. Should they be ignored, dismissed, or misinterpreted, the deceiver is probably not worse off. Should they be interpreted as he intends, the deceiver stands to gain. The target must pay attention even to scenarios which he suspects to be untrue if they are plausible and consequential to his interests. Although the target may ultimately choose not to act on them, the additional time he spends evaluating deceptive scenarios or searching for further information should benefit his foe.

The danger in accepting an advantage to the deceiver is to assume that it will significantly contribute to victory. It may well do so,

but as Hesketh would undoubtedly agree, the contribution is very difficult to measure. Hesketh proceeded as best he could, concentrating primarily on the actions of his group and on the content, timing and reasons for German beliefs. To truly certify Fortitude's impact, however, would have required determining not only what the victim might have believed and done in the absence of deception, but also distinguishing deception's impact from among other factors such as troop morale, quantity and quality of weapons, generalship, or effective planning. These analytical tasks are prodigious, some might say impossible; yet deception analysts must confront them. Beyond studying the use of deception in individual instances we should next try to identify a model to evaluate its relative significance across a wide range of cases.

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30. Ibid., pp. 222-226.

31. Whaley, Stratagem, p. 229; see also his discussion of the relationship of security and deception, with somewhat different emphases, pp. 225-226.

32. Maj. C.H. Bennet, "German Appreciation of Operation Starkey," COSSAC/41 DX/INT, 1 September 1943, RG 331; Maj. R.B. Woodruff, "Conduct of Deceptive Planning, COCKADE-WADHAM," 24 September 1943, RG 165; Lt. Gen. F. Morgan, letter of 25 July 1943, RG 331, MMR, NA. Morgan's plaintive tone suggests the frustrations deceivers face, e.g., "Now for pity's sake, tell me who tells who what and when, and what he expects them to believe anyway. I refuse to see anybody in the information world [the press] about any of this until I am absolutely clear as to what it is all about, which looks to me like being never."

33. "Plan 'Fortitude,'" 23 February 1944, SHAEF, RG 319, MMR, NA.; Roger Fleetwood Hesketh, "Fortitude. A History of Strategic Deception in North Western Europe, April, 1943 to May, 1945," unpublished manuscript, February, 1949, pp. 87-98, 112-129 *passim*.

34. Jones, p. 26 suggests a similar point in the context of how practical jokes deceive their victims.

35. Cruickshank, pp. 191-194; interview with Ronald Lewin, 26 September 1979, London.

36. J.C. Masterman, The Double-Cross System in the War of 1939 to 1945 (New Haven and London: Yale University Press), 1972, pp. 30-31.

37. H.J. Giskes, London Calling North Pole (NY: The British Book Centre, Inc., 1953).

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39. "Exhibit 3: 'Cover and Deception,'" p. 4.
40. Whaley, Codeword Barbarossa, pp. 223-224.
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COGNITIVE FACTORS IN DECEPTION AND COUNTERDECEPTION

Richards J. Heuer, Jr.

INTRODUCTION

To be successful, deception must achieve a desired impact upon the thinking of the deception target, either a national or military decision-maker or the intelligence analyst working for the decision-maker. The chances of success are enhanced the more a deceiver understands about the thought processes of the target leaders or analysts. Conversely, the chances of avoiding deception increase the more one understands one's own information processing capabilities and limitations. In examining these judgmental processes, one can either determine the propensities and pre-dilections of individual persons or examine those factors that most men and women seem to have in common. This paper takes the latter approach.

That human beings often make erroneous judgements is self-evident from our daily experience, and it has been demonstrated by many psychological experiments. Military, political and economic issues involving interaction with other nations are among the most complex analytical problems. This complexity is normally exacerbated by lack of information concerning some critical elements of a problem and a large volume of fragmentary, ambiguous and even erroneous information concerning other elements. Judgements must be made in the face of great uncertainty.

Over 20 years ago, Herbert Simon advanced the concept of "bounded" or limited rationality.¹ Because of limits in our mental capacity, he argued, the human mind cannot cope directly with the complexity of the world. Rather we construct in our mind a simplified model of reality

and then work with this mental model. We behave rationally within the confines of our mental model, but this model is generally not very well adapted to the requirements of the real world.

Simon's theory of bounded rationality was stimulated by earlier psychological research on perception, memory, attention span, and reasoning capacity that documents limitations in our "mental machinery." A principal thesis underlying more recent research has been that these limitations cause us to employ various simplifying strategies when processing information to make judgements and decisions. Psychologists have conducted many experiments to identify these strategies and to show how - at least in laboratory situations - they affect our judgment and decisions. Students of international relations, particularly Robert Jervis,² have conducted historical research to document instances in which political and military decisions appear to have been significantly influenced by these psychological variables.

This research provides substantial experimental and historical evidence to support Jervis' conclusion that "perceptions of the world and of other actors diverge from reality in patterns that we can detect and for reasons that we can understand."³ These patterns of erroneous perception and judgment are frequently called "biases." A bias, as the term is used here, is an error in judgment that is consistent and predictable. It is not predictable in the sense that all persons under the same circumstances will make the same error all the time. Rather, it is predictable in a statistical sense, in that given a large number of cases most people will be influenced by this tendency most of the time.

One can identify several types of biases. Motivational biases result

from the influence on judgment of our ambitions and fears, and the need to perceive our past behavior as commendable and consistent. The functional roles and circumstances of organizations generate patterns of biased organizational judgment.* Cultural biases are rooted in predispositions inherent in one's cultural values and heritage.

This paper deals only with perceptual and cognitive biases. Perceptual biases arise from the nature of the process by which we perceive the world about us, and they limit the accuracy of our perceptions. Cognitive biases result not from any intellectual or emotional predisposition toward a certain judgment, but simply from the way the mind tends to work. They influence how we estimate probabilities, evaluate evidence, and attribute causality.

Of the diverse forms of bias, we have opted to discuss perceptual and cognitive biases for two reasons. They are the most general forms of bias, presumably affecting all persons regardless of cultural background or organizational affiliation. Cognitive biases are also the least well known, for most research on these biases is of recent origin.

The paper is divided into three sections, one dealing with perceptual biases, one with cognitive biases, and a concluding section that includes discussion of the broad problem of countering deception. Not all perceptual and cognitive biases are discussed here, for we have selected just those that seem most relevant to the problem of deception. The first two sections present the biases sequentially with a concluding discussion relating them to the deception problem. These discussions are principally from the point of view of the deception planner, for countering deception

* For example, Richard Betts contends that military intelligence has an organizational bias toward "worst-case" analysis in analyses that support procurement planning and "best-case" analysis in evaluating the results of military operations.⁴

involves basically different problems discussed primarily in the conclusion. An Appendix contains a brief summary of all the biases and their implications.

A word of caution before proceeding further. How humans perceive and process information to arrive at analytical judgments is not fully understood. Although the evidence presented here is persuasive, it is not conclusive. The intention of this paper is not to deliver the last word in psychological theory, for psychologists differ among themselves just as much as historians, intelligence analysts or priests. The purpose is to describe the current state of knowledge from a perspective that views human cognitive processes as a critical variable in explaining fallible human judgment. The aim is to learn something about how people make judgments, and to provide guidelines concerning how to exploit this knowledge to deceive others or prevent being deceived ourselves. The guidance is limited to principles that will generally be helpful, not firm rules that guarantee an optimal result, for judgment is not guided by algorithms that ensure a correct answer.

BIASES IN PERCEPTION

The process of perception links the individual to his or her environment and is critical to accurate understanding of the world about us. We tend to think of perception as a passive process; we see, hear, smell, taste or feel stimuli that impinge upon our senses. If we are at all objective, we record what is actually there.

Yet perception is demonstrably an active rather than a passive process; it constructs rather than records "reality." Perception implies understand-

ing as well as awareness. It is a process of inference in which the individual constructs his or her own version of "reality" on the basis of information provided by the senses. This sensory input is mediated by complex and poorly understood mental processes that determine which information we attend to, how we organize it, and the meaning we attribute to it. Thus what we perceive and how readily we perceive it is strongly influenced by our past experience, education, cultural values and role requirements, as well as by the stimuli recorded by our receptor organs. This should shake some traditional assumptions about "objectivity" in analysis.



Perception is a process of constructing reality rather than recording it.

Figure 1

Expectations Condition Perception

Many experiments have been conducted to demonstrate the extraordinary extent to which the information obtained by an observer depends upon the observer's own expectations, assumptions and preconceptions. For example, when you looked at Figure 1, above, what did you see? Did you note that the article is written twice in each of the three phrases. This is commonly overlooked, because perception is influenced by our expectations about how these familiar phrases are normally written. If you perceived Figure 1 correctly, you have exceptional powers of observation, were lucky, or have seen the figure before. This simple experiment demonstrates one of the most fundamental principles concerning per-

ception: we tend to perceive what we expect to perceive. A corollary of this principle is that it takes more information, and more unambiguous information, to recognize an unexpected phenomenon than an expected one.

Another classical experiment to demonstrate the influence of expectations on perception used playing cards, some of which were gimmicked so the spades were red and the hearts black. Pictures of the cards were flashed briefly on a screen and, needless to say, the test subjects identified the normal cards more quickly and accurately than the anomalous ones. After test subjects became aware of the existence of red spades and black hearts, their performance with the gimmicked cards improved but still did not approach the speed or accuracy with which normal cards could be identified.⁵ This shows that patterns of expectation become so deeply embedded that they continue to influence perceptions even when we are alerted to and try to take account of the existence of data that do not fit our preconceptions. Trying to be objective does not guarantee accurate perception.

The position of the test subject identifying playing cards is analogous to that of the intelligence analyst or government leader trying to make sense of the paper flow that crosses his desk. What is actually perceived in that paper flow, as well as how it is interpreted, depends in part, at least, on the analyst's patterns of expectation. We do not have expectations just about the color of hearts and spades. We have a set of assumptions and expectations about the motivations of people and the processes of government in foreign countries. Events consistent with these expectations are perceived and processed easily; those which contradict prevailing expectations tend to be ignored or distorted in

perception. Of course, this distortion is a subconscious or pre-conscious process, as illustrated by how you presumably ignored the extra words in the triangles in Figure 1.

This tendency to perceive what we expect is far more important than any tendency to perceive what we want. In fact, there may be no real tendency toward wishful thinking. The commonly cited evidence supporting the claim that people tend to perceive what they want to perceive can generally be explained equally well by the expectancy thesis or the availability bias (to be discussed later).⁶

Expectations have many diverse sources, including past experience, professional training, and cultural and organizational norms. All these influences predispose us to pay particular attention to certain kinds of information and to organize and interpret this information in certain ways. Perception is also influenced by the context in which it occurs. Different circumstances evoke different sets of expectations. We are more attuned to hearing footsteps behind us when walking in an alley at night than along a city street in daytime, and the meaning we attribute to the sound of footsteps will vary under these differing circumstances. A military intelligence analyst is similarly tuned to perceive indicators of potential conflict. When the evidence is ambiguous, as is commonly the case in intelligence analysis, this predisposition increases the likelihood the indicators will be perceived accurately when they in fact exist and escape the attention of other observers, but it also increases the chances they will be perceived erroneously when they are not really there.

Patterns of expectation, rooted in past experience and training, tell us, subconsciously, what to look for, what is important, and how to

interpret what we see. These patterns form a "mind set" that predisposes us to think in certain ways. A mind set is akin to a screen or lens through which we perceive the world. For example, the following truisms have been part of the mind set of intelligence analysts:

-- A totalitarian government enjoying the support of effective military and security organizations cannot be overthrown by popular opinion.

-- When the position of a dictatorial ruler is threatened, he will defend his position with force if necessary.

-- The principal threat to friendly governments comes from the left, not the right.

These premises were part of the lens through which U.S. policy makers and intelligence analysts alike perceived developments in Iran in 1978 prior to the fall of the Shah. They had a significant impact on where analysts focused their attention, what they expected to happen, and how they interpreted the unfolding events. That all these "truisms" were proven wrong in that instance is perhaps no small part of the explanation why the Shah's demise took the United States government by surprise.

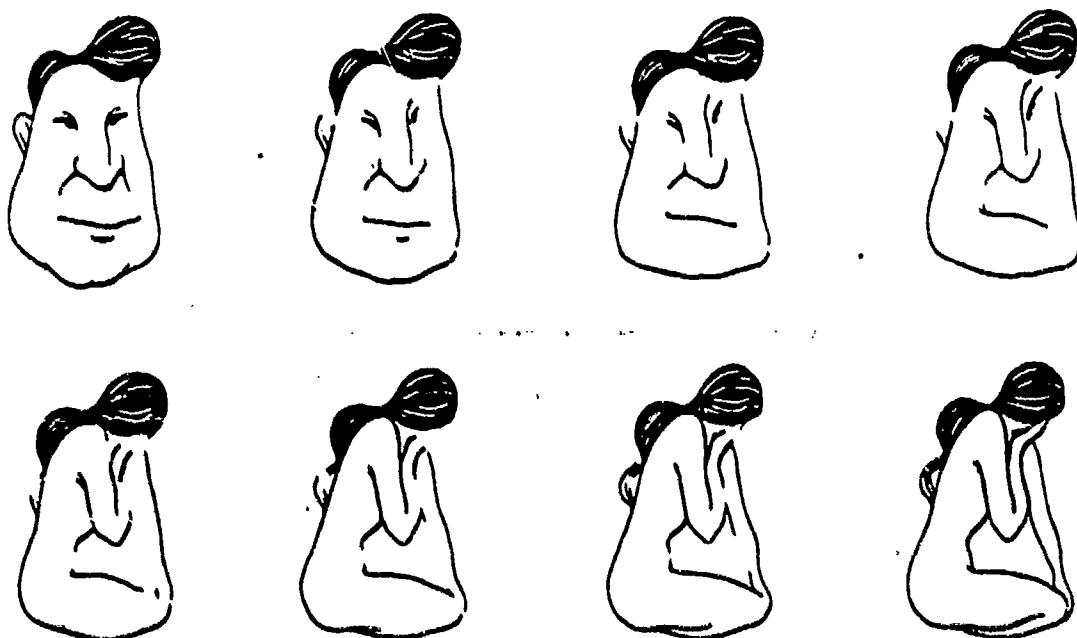
There is a tendency to think of a mind set as something bad, to be avoided. One should have an open mind and be influenced by the facts rather than by preconceived notions! But there is no such thing as "the facts of the case." There is only a very selective subset of the overall mass of data to which we have been subjected that we take as facts and judge to be relevant to the question at issue. Actually, mind sets are neither good nor bad; they are unavoidable. There is no conceivable way of coping with the volume of stimuli that impinge upon our senses, or with the volume and complexity of the data we have to analyze, without some kind of simplifying preconceptions about what to expect, what is important, and what is related to what. "There is a grain of truth in

the otherwise pernicious maxim that an open mind is an empty mind."⁷ Objective analysis is not achieved by avoiding preconceptions (that would be ignorance or self-delusion), but by making our basic assumptions and reasoning as explicit as possible so they can be challenged by others and we can ourselves examine their validity.

Perceptions Resist Change

One of the most important characteristics of perceptions is that they are quick to form, but resistant to change. Once we have perceived an object, event or situation and formed some judgment about its essential characteristics, we are biased toward continuing to perceive it in the same manner even though the object of our perception may change.

Figure 2 illustrates this principle by showing part of a longer series of progressively modified drawings that change almost imperceptibly from a man into a woman.⁸ The right hand drawing in the top row, when



Impressions resist change.

Figure 2

viewed alone, has equal probability of being perceived as a man or a woman. When test subjects are shown the entire series of drawings, one by one, their perception of this intermediate drawing is biased according to which end of the series they started from. Test subjects who start by viewing a picture that is clearly a man are biased in favor of continuing to see a man long after an "objective observer" (i.e., an observer looking at a single picture) recognizes that the man is now a woman. Similarly, test subjects who start at the woman end of the series are biased in favor of continuing to see a woman. Once an observer has formed an image, that is, once he or she has developed a mind set or expectation concerning the phenomenon being observed, this conditions future perceptions of that phenomenon. This is the basis for yet another general principle of perception: new information is assimilated to existing images.

This principle explains why gradual, evolutionary change often goes unnoticed. It also explains the phenomenon that an intelligence analyst assigned to work on a topic or country for the first time may generate accurate insights that have been overlooked by experienced analysts who have worked on the same problem for ten years. A fresh perspective is sometimes useful, for past experience can handicap as well as aid analysis. This tendency to assimilate new information to pre-existing images is greater "the more ambiguous the information, the more confident the actor is of validity of his image, and the greater his commitment to the established view."⁹

Figure 3 provides the reader an opportunity to test for him or herself the persistence of established images. Look at the picture. What do you see - an old woman or a young woman? Now look again to see if you can visually and mentally reorganize the data to form a different image -



It is difficult to look at the same data from different perspectives.

Figure 3

that of a young woman if your original perception was of an old woman, or of the old woman if you first perceived the young one.¹⁰ Do not look at the footnote unless you need clues to help you identify the other image.* Again, this illustrates the principle that perceptions are quick to form but resistant to change.

When you have seen Figure 3 from both perspectives, try shifting back

* The old woman's nose, mouth and eye are, respectively, the young woman's chin, necklace and ear. The old woman is seen in profile looking left. The young woman is also looking left, but we see her mainly from behind so most facial features are not visible; her eyelash, nose and curve of her cheek may be seen just above the old woman's nose.

and forth from one perspective to the other. Do you notice some initial difficulty in making this switch? One of the most difficult mental feats is to take a familiar body of data and reorganize it visually or mentally to perceive it from a different perspective. Yet this is what intelligence analysts are constantly required to do. In order to understand international interactions, we must understand the situation as it appears to each of the opposing forces, and constantly shift back and forth from one perspective to the other as we try to fathom how each side interprets an ongoing series of interactions. Trying to perceive Soviet as well as U.S. interpretations of international events is comparable to seeing both the old and young women in Figure 3; once we have perceived events one way, we tend to resist alternate perspectives.

Impact of Ambiguity

Initial exposure to ambiguous or blurred stimuli interferes with accurate perception even after more and better information becomes available. This effect has been demonstrated experimentally by projecting onto a screen pictures of common, everyday things such as a dog standing on grass, a fire hydrant, and an aerial view of a highway cloverleaf intersection.¹¹ The initial projection was blurred in varying degrees, and the pictures were then brought into focus slowly to determine at what point test subjects could identify them correctly. This experiment showed two things. First, those who started viewing the pictures when they were most out of focus had more difficulty identifying them when they became clearer than those who started viewing at a less blurred stage. In other words, the greater the initial blur, the clearer the picture had to be before people could recognize it. Second, the longer time that people were exposed to a blurred picture, the clearer the picture

had to be made before they could recognize it.

What happened in this experiment, and what presumably happens in real life with cognitive as well as visual perceptions, is that despite ambiguous stimuli we form some sort of tentative hypothesis about what it is we are seeing. The longer we are exposed to the ambiguous data, the greater confidence we develop in this initial and perhaps erroneous impression, so the greater the impact this initial impression has on our subsequent perceptions. For a time as the picture becomes clearer, there is no obvious contradiction; the new data is assimilated to our previous image, and the initial interpretation is maintained until the contradiction becomes so obvious that it forces itself upon our consciousness. The early but incorrect impression tends to persist because the amount of information necessary to invalidate a perception is considerably greater than the amount of information required to form an initial impression. The problem is not that there is any inherent difficulty in grasping new perceptions or new ideas, but that established perceptions are so difficult to lose. Thus inaccurate perceptions generated by ambiguous data may persist even after additional information has been received to clarify the initial ambiguity. One might seek to limit the adverse impact of this tendency by suspending judgment for as long as possible as new information is being received.

Implications for Intelligence Analysis

Understanding the ways in which perception is commonly distorted has significant implications for comprehending the nature and limitations of intelligence analysis. If we consider the circumstances under which accurate perception is most difficult, we find these are exactly the circumstances under which intelligence analysis is generally conducted - dealing with highly ambiguous situations on the basis of information that is pro-

cessed incrementally under pressure for early judgment. This is a recipe for inaccurate perception. That intelligence analysts perform as well as they do is testimony to their generally sound judgment, training and dedication in performing an extremely difficult task.

Intelligence seeks to illuminate the unknown. Almost by definition, intelligence analysis deals with highly ambiguous situations. Yet we have seen that the greater the ambiguity of the stimuli, the greater the impact of expectations and pre-existing images on the perception of that stimuli. Thus despite maximum striving for objectivity, the intelligence analyst's own preconceptions are likely to exert a greater impact on the analytical product than in other fields where the analyst is working with less ambiguous and less discordant information.

Moreover, the intelligence analyst is among the first to look at new problems at an early stage when the evidence is very fuzzy indeed. The analyst then follows a problem as additional increments of evidence are received and the picture gradually clarifies - much as the test subjects in the experiment demonstrating that initial exposure to blurred stimuli interferes with accurate perception even after more and better information becomes available. If the results of this experiment can be generalized to apply to intelligence analysts, it suggests that because the analyst starts observing a potential problem situation at its early and most unclear stage, he or she is at a disadvantage as compared with others - for example, policy makers - whose first exposure may come at a later stage when more and better information is available.

The receipt of information in small increments over time also facilitates assimilation of this information to the analyst's existing views. No one item of information may be sufficient to prompt the analyst to

change his view. The cumulative message inherent in many pieces of information is not examined as a whole. The Intelligence Community review of community performance before the 1973 Arab-Israeli War noted

The problem of incremental analysis - especially as it applies to the current intelligence process - was also at work in the period preceding hostilities. Analysts, according to their own accounts, were often preceding on the basis of the day's take, hastily comparing it with material received the previous day. They then produced in 'assembly line fashion' items which may have reflected perceptive intuition but which [did not] accrue from a systematic consideration of an accumulated body of integrated evidence.

And finally, the intelligence analyst operates in an environment that exerts strong pressures for premature judgment. Policy makers' needs for interpretive analysis are greatest within at most two or three days after a new event occurs. The system requires the intelligence analyst to make an almost instant diagnosis before sufficient hard information becomes available to make a well-grounded judgment. This diagnosis can only be based upon the analyst's preconceptions concerning how and why events normally transpire in a given society.

As time passes and more information is received, a fresh look at all the evidence might suggest a different explanation. Yet we have seen from the various perception experiments that an early judgment adversely affects the formation of future perceptions. Once an observer thinks he or she knows what is happening, this perception tends to resist change. The new information received incrementally fits easily into the analyst's previous image. This perceptual bias is reinforced by organizational pressures favoring consistent interpretation, for once the analyst has committed him or herself in writing, both the analyst and the organization has a vested interest in maintaining the original diagnosis.

Implications for Deception

One overwhelming conclusion stands out with respect to deception: it is far easier to lead a target astray by reinforcing the target's existing beliefs, thus causing the target to ignore the contrary evidence of one's true intent, than it is to persuade a target to change his or her mind.

Military operations possess a certain logic. Terrain, weather, supplies and the relative balance of forces often suggest optimal tactics or strategy. Yet, if the preferred alternative is equally obvious to the enemy, these advantages can be offset by the enemy's counter-preparations. Thus planners of military operations may use deception to conceal their true intent, and in doing so they are faced with two basic alternatives. They can plan to attack in a place, time and manner most expected by the enemy, while seeking through deception to achieve surprise by changing the enemy's expectations. Or they can reinforce the enemy's expectations while planning a surprise attack in a different place, time or manner.

The tendencies to perceive what we expect to perceive and to assimilate new information to existing images make it far easier to reinforce a target's existing beliefs than to change them. Deceptions that follow this principle seldom fail, for the odds are then strongly in favor of the deceiver. The human capacity to rationalize contradictory evidence is easily sufficient to outweigh the pernicious effects of security leaks and uncontrolled channels of information that deception planners might otherwise fear are certain to compromise their efforts.

Deceptions that require persuading a target of something he is not already predisposed to believe should be avoided if at all possible. If nonetheless required by the operational situation, the chances for success may be enhanced by following a simple sequencing rule. Because of the tendency to integrate new information into existing beliefs, the first goal

in any effort to change beliefs must be to ensure that the target is at least considering seriously the desired alternative hypothesis. This may require initiating the deception with strong and obvious evidence that forces the desired conclusion to be at least considered seriously by intelligence analysts and policy makers. This is then followed in quick succession by additional supporting evidence that leads the target to a reasoned conclusion in favor of the desired alternative.

The opposite tactic, which seems incorrect from a psychological point of view, would be to save the more dramatic evidence until after the stage has been set by transmitting a number of supporting messages. The expectation is that the target initially attributes little importance to the supporting messages, but once the key is received the other pieces are perceived to fall into place forming a coherent and persuasive picture. The weakness of this tactic is that the target may have failed to notice, forgotten or misinterpreted the earlier evidence, for information that does not fit neatly into an existing hypothesis tends to be ignored or misperceived. Intelligence analysts and policy makers are commonly confronted with a large amount of discordant information. They have only a limited capacity to sort and store discordant or seemingly irrelevant information in memory in a manner that makes it possible to recall it for the evaluation of hypotheses that are not now under consideration.

Planning and implementing a deception typically involves a major investment of time, energy and ego. When people make such an investment in preparing a message, they tend to overestimate how clear this message will be to the receiver. This results from the importance of context in perceiving and interpreting a signal; when a message is placed in a different context it assumes a different meaning. The message developed by the deception planners is understood by them in the context of the endless

meetings in which alternatives were weighed and details worked out. They are so familiar with their own thinking that they risk overlooking the degree to which the message is clear to them only because they know what to look for.

The target of a deception is likely to have a different agenda of concerns, different predispositions and a different information base than the deception planners. Normally this will lead to a different interpretation of messages. If the deception planners have sufficient understanding of the target's situation and thinking, messages may be planned to take advantage of the particular context in which they will be received, but in practice the target may miss many clues the deceiver sets out for him and may assign considerable weight to factors the deceiver regards as trivial or to information of which the deceiver is wholly unaware. To the extent that the deception signals reinforce the target's expectations, there is a large margin for error and these miscalculations have little impact. If the goal is to change the target's mind, however, they may be critical.

It is not by accident that discussion to this point has concerned implications for the perpetration of deception rather than its detection. The counterdeception problem is extremely difficult. When should we disbelieve our eyes and ears and the seemingly logical conclusions of our mind? When should we second guess, and say to ourselves that since most of the evidence points to X, then Y must be true rather than X? Even in the absence of deliberate deception, the evidence at the most critical junctures is typically so ambiguous that the proper conclusion is far from obvious. To the extent that we cannot believe the evidence, the analytical problem becomes even more complicated. The problem of detecting deception is not simply a matter of accurate perception. It is embedded

in the much larger problem of effective intelligence collection and analysis, and we reserve discussion of these points until the end of this paper.

COGNITIVE BIASES

The cognitive biases discussed here are grouped according to whether they affect the estimation of probabilities, the evaluation of evidence, or the attribution of causality.

Biases in Estimating Probabilities

Estimating probabilities is important because we live in a probabilistic world. Social, political, military and economic developments are not rigidly determined but occur or fail to occur with some degree of probability. Decision makers cannot be certain of the outcome of their actions, so they must weigh the probabilities of alternative outcomes. The information on which these decisions are based also involves many uncertainties expressed in probabilistic terms. The intelligence analyst, for example, is constantly assessing probabilities with respect to the intentions of foreign leaders, the capability of military forces, the future consequences of current events, or the credibility of sources.

Typically, these probability judgments are expressed in imprecise terms such as possibly, probably or very likely - terms that unfortunately have different meanings to different people. But the issue here is not whether communication and decision making can or should be improved by replacing these verbal qualifiers with numerical ranges of probability. It is whether the estimates themselves are influenced by systematic biases that affect their accuracy. Research by experimental psychologists suggests that this is in fact the case. Knowledge of these biases may be useful to those planning deception or seeking to avoid it.

Availability Bias

One of the simplified rules of thumb we use in making probability estimates is known as the availability rule. In this sense availability refers to imaginability or retrievability. Psychologists have shown that two of the cues we use in judging the probability of an event are 1) the ease with which we can imagine relevant instances of the event, and 2) the number or frequency of such events that we can easily remember.¹² In other words, we are using the availability rule of thumb whenever we estimate frequency or probability on the basis of how easily we can recall or imagine instances of whatever it is we are trying to estimate.

Normally this works quite well. If one thing actually occurs more frequently and therefore is more probable than another, we probably will be able to recall more instances of it. Events that are likely to occur generally are easier to imagine than unlikely events. We are constantly making inferences based on these assumptions. We estimate the probability of successful deception by recalling historical examples of deception under similar circumstances. We estimate the probability that a politician will lose an election by imagining ways in which he may lose popular support. Although this generally works well, we are often led astray because the ease with which things come to mind is influenced by many factors, such as emotional saliency, vividness and how recently we have been exposed to them, all of which may be unrelated to the correct probability. When this happens, our judgment is biased in favor of the probability of those events that are most available. For example, the Soviet assessment of the likelihood that Germany may once again become a military threat to Soviet interests seems clearly biased by the ready availability of vivid memories of the Second World War.

Intelligence analysts often have difficulty estimating the likelihood of low probability events, especially when those events have potentially very serious consequences. For example, what is the likelihood of civil war in Canada, perhaps even including Soviet or Cuban assistance to Quebec, during the next ten years? Or the likelihood of an aggressively anti-American, Castro-like government coming to power in Mexico? It is difficult for us to imagine such developments, so we assign them a very low probability, but imaginability is most likely irrelevant to an accurate assessment of the probability that either of these developments will actually occur. To the extent that our estimate is influenced by ready imaginability rather than by a full analysis of the causal factors at work, we are likely to underestimate the true probability.

Sino-Soviet reconciliation is another low probability, high significance event, but here the availability bias is likely to cause people to overestimate the probability of it actually happening. This is because it is so easy to imagine such a development and what impact it would have on U.S. policy. In fact, our memory of having been taken by surprise by the Sino-Soviet split causes many people to be preoccupied by the possibility of reconciliation. Analysts working full time on this question are considering the operative causal factors, not making quick and easy inferences on the basis of imaginability. But the policymaker or generalist who does not have the time or the information to go into details must unconsciously take shortcuts, and the obvious shortcut is to use the availability rule of thumb for making inferences about probability.

Anchoring Bias

Another strategy that people seem to use intuitively and unconsciously to simplify the task of mentally processing complex information is called

"anchoring." Some natural starting point is used as a first approximation to the desired judgment. This starting point is then adjusted, based on the results of additional information or analysis. Typically, however, the starting point serves as an anchor or drag that reduces the amount of adjustment, so that the final estimate remains closer to the starting point than it ought to be.

Anchoring has been demonstrated by asking a group of test subjects to estimate one or more known quantities, for example, the percentage of people in the United States who are age 55 or older. In an experiment that used this question, the test subjects were given starting percentages that were selected randomly - they were drawn out of a bowl - and were then asked to adjust these arbitrary starting points until they reached their best estimate in response to the question. Because of insufficient adjustment, those who started out with an estimate that was too high ended with higher estimates than those who started with an estimate that was too low, and vice versa. Even the totally arbitrary starting points acted as an anchor, causing drag or inertia that inhibited full adjustment of estimates to the point that the test subjects would otherwise have considered desirable.¹³

Policy makers and intelligence analysts deal with dynamic situations. They must continually review their estimates in response to changes in the situation or the receipt of previously unavailable information. Ideally, there should be a direct correlation between changes in the situation and/or new information and changes in the estimate, but such is frequently not the case. There is much evidence to suggest that people do not change their judgments enough. Once an estimate is made, thinking becomes anchored and moves only within a narrow range around that spot.

Overconfidence Bias

Problems of perception and bias might be less serious if people had a better appreciation for the limits of their own knowledge. Many tests have been conducted that show people have difficulty expressing accurately the degree of uncertainty in what they know or believe. People tend to be overconfident about how much they know.

The Subjective Probabilities Assessment Test (SPAT) uses 75 general knowledge questions with known answers taken from an almanac. Test subjects are asked not just to answer the questions, but for each question to also assign a probability that shows how confident they are that their answer is the correct one. For questions with two possible answers, a 50% probability indicates complete uncertainty about which of the two answers is correct, while 100% indicates absolute certainty that the chosen answer is the proper one.

Performance on the SPAT test is not measured by the number of correct answers, but by the "calibration" between assessed probability that the answer is correct and the actual number of correct answers at each probability level. If a subject indicates 70% certainty on ten questions, then a perfect score would be seven correct and three incorrect answers. Under such circumstances, we would say that the person's subjective or intuitive feeling of certainty is perfectly calibrated with the reality of his performance. On the other hand, only five or six correct answers would indicate overconfidence and eight or nine correct answers underconfidence in assessing the accuracy of one's knowledge.

Figure 4 shows the results from testing almost 1,000 DIA and CIA intelligence analysts and managers.¹⁴ For questions on which analysts ex-

pressed 100% confidence, the median analyst was correct only 76% of the time.

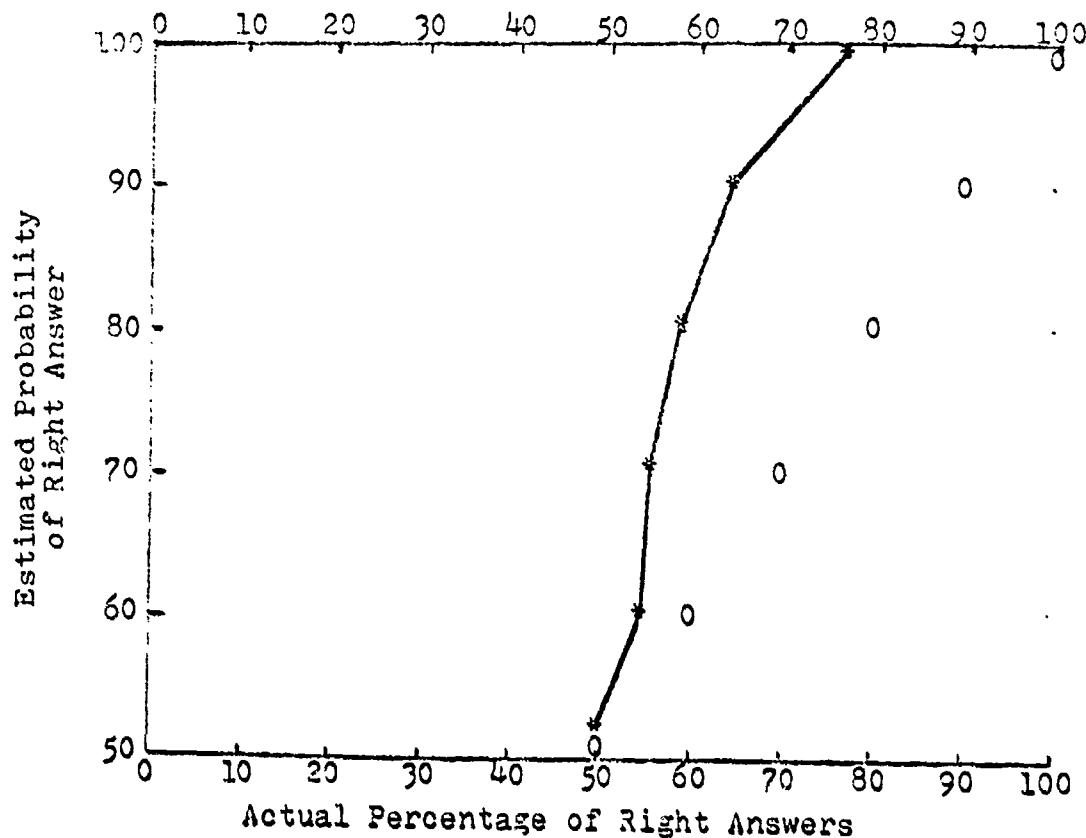


Figure 4

When expressed confidence was 90%, the judgment was correct on only 63% of the questions, and so on as indicated in the graph. In brief, the test demonstrated that the intuitive feelings of certainty of intelligence analysts do not conform with reality. The analysts are markedly overconfident of how much they know.

Very similar results have been found with test groups not affiliated with the intelligence community.¹⁵ Experiments have shown that the overconfidence bias is greater for difficult questions than for easy ones. Training involving feedback on one's performance improves the calibration between expressed confidence and actual performance; weather forecasters perform exceptionally well on the SPAT test, doubtless because they commonly

receive rapid feedback on the accuracy of their probability judgments. On the other hand, neither superior intellectual ability nor expertise in the subject matter of the questions has been found to improve performance in assessing the certainty of one's knowledge.

The intelligence analyst's subjective overconfidence may not be translated into overconfident intelligence judgments. Organizational and motivational incentives also influence how the analyst expresses his level of confidence when writing an intelligence report. Hedging to avoid embarrassment in the event of error and overwriting to mask ignorance are not uncommon. The bias toward overconfidence applies to the private feelings of analysts, not necessarily to the way they present these feelings in formal intelligence products.

Implications for Deception

Availability bias may make analyst believe that strategic deception is more common than it really is, and thus cause them to be more disposed to perceive it. Successful cases of deception are far more salient, and consequently more available for recall in memory, than cases in which deception was not employed under comparable circumstances. Deception attracts both the popular imagination and the attention of historians, while the absence of deception in strategic operations does not. When an analyst is faced with a situation in which deception may or may not be employed, his or her estimate of the probability of deception is influenced by this easy retrievability of past instances of deception.

The availability bias also suggests that employees of watch offices will tend to overestimate the probability of whatever it is they are watching for. Having been briefed and trained to recognize certain indicators,

and having imagined and rehearsed scenarios that include the watched-for developments, it is not surprising that the watched-for developments are at the forefront of their minds as they try to forecast the future course of events. To the extent that the watched-for development is judged more probable, the perceptual bias of seeing what we expect to see also plays a greater role.

If the goal of a deception is to induce ambiguity or to persuade the watch officers that what they are watching for is not happening, e.g., that there is no intent to attack when an attack is in fact planned, a watch office is an extremely difficult deception target. On the other hand, it may be possible to exploit the watch officers' preconceptions, for example, as part of a plan to exploit the cry wolf syndrome. The watch office might be provoked to issue an alert of impending attack several times when no attack is in fact planned, so that future alerts will be received more skeptically. In this procedure, the availability of the attack scenario is countered by building up in the watch officers another availability - the memory of recent false alarms.

Policy makers and others seeking to avoid deception would do well to keep the availability bias in mind and to check the extent to which it influences their thinking on critical issues. If their judgments of the likelihood of future events are determined by imaginability or retrievability rather than by causal analysis, they should have little confidence in these judgments and should seek an independent assessment based on more systematic analysis.

The significance of the anchoring bias to the deception planner depends upon the type of deception being planned. If the goal is to change a tar-

get's previous beliefs, anchoring will facilitate achieving this objective.

Because the anchoring bias tends to prevent analysts from revising their estimates as much as they should when new information is received, analysts seeking to avoid surprise will generally wish to try to overcome this bias. The prognosis is not favorable. In one experiment, the bias persisted even after test subjects had been given feedback to show the bias and after they had been urged to try to overcome this tendency in answering a new set of estimation questions.¹⁶ This is a common finding in experiments dealing with cognitive biases; the biases persist even after test subjects are informed of them and instructed to try to avoid them or compensate for them.

One possible technique for avoiding the anchoring bias, to weigh anchor so to speak, may be to ignore one's own or others' earlier judgments and rethink a problem from scratch. In other words, consciously avoid using any prior judgment as a starting point. There is not experimental evidence to show that this is possible or that it will work, but it certainly seems worth trying. Alternatively, it is sometimes possible to avoid human error by employing formal statistical procedures. Bayesian statistical analysis, for example, can be used to revise prior judgments on the basis of new information in a way that is designed to avoid any anchoring bias.¹⁷

Overconfidence exacerbates the impact of all the biases. Although a written estimate may have been hedged, if the analyst's subjective feeling is one of overconfidence and satisfaction with his or her estimative performance, there will be few efforts to improve. For the deception planner, the implications of a target's overconfidence are the same as the implications of the anchoring bias. It is one more obstacle to overcome in inducing a target to change his or her mind, but it can be readily exploited if the

objective is to reinforce the target's existing convictions. In ambiguity-inducing deceptions, the intent is to reduce the target's confidence.

BIASES IN EVALUATION OF EVIDENCE

Collection and evaluation of evidence are crucial steps in analysis. Are there systematic biases in the way we handle evidence? We have seen in our discussion of perception that new information tends to be assimilated to existing images. Thus the order in which we receive information affects our judgment. Evidence received early in an investigation has a greater impact on our thinking than evidence received after our impressions have already formed. At present, however, we are concerned with several other problems as discussed below.

Oversensitivity to Consistency

Consistency is normally an appropriate guideline for evaluating evidence. We formulate alternative explanations or predictions and select the one which encompasses the greatest amount of evidence within a logically consistent scenario. When very little evidence is available, however, we tend to be oversensitive to consistency. We have more confidence in conclusions drawn from a very small body of consistent information than from a larger body of less consistent data. This is incorrect, because conclusions drawn from very small samples are highly unreliable.

Test subjects were asked to predict students' class standing on the basis of grades obtained in the freshman year, and to indicate the amount of confidence they had in their predictions. The predictions were almost identical when based on a single B in one course as when based on an A in one course and a C in another, but there was a significant difference in level of confi-

dence. Subjects expressed far more confidence when predicting from a single grade than from an inconsistent pair of grades. This is not justifiable statistically.¹⁸

Similarly, a government leader is likely to have more confidence in a recommendation reached unanimously by a group of three advisors than in a recommendation concurred in by 10 members of a 12-man panel. This, too, is inconsistent with the laws of statistical probability. When an intelligence analyst has little data on a certain subject, but all the data are consistent, the analyst is likely to overestimate the degree of confidence he or she should have in the judgment drawn from that data.

Absence of Evidence

One of the significant differences between intelligence analysis and most academic research concerns degree of control in determining the data that are used. The academic researcher generally tries to define his or her research problem as one for which the data are known to be available. The intelligence or policy analyst is generally drawing inferences from very incomplete data. He or she must work with the evidence at hand and somehow take into account the fact that much relevant information is known to be missing.

Ideally, intelligence analysts should recognize that relevant evidence is lacking and be able to factor this into their calculations, estimating the potential impact of the missing data and adjusting confidence in their judgment downward in recognition that key information is unavailable. Unfortunately, this ideal may not be the norm. "Out of sight, out of mind" may be a better description of the impact of gaps in the evidence.

This problem can be demonstrated using a fault tree, which is a schematic drawing showing all the things that might go wrong with any endeavor.

Fault trees are often used to study the fallibility of complex systems such as a nuclear reactor or space capsule. Figure 5 is a fault tree showing all the reasons why an automobile might not start.

FAULT TREE

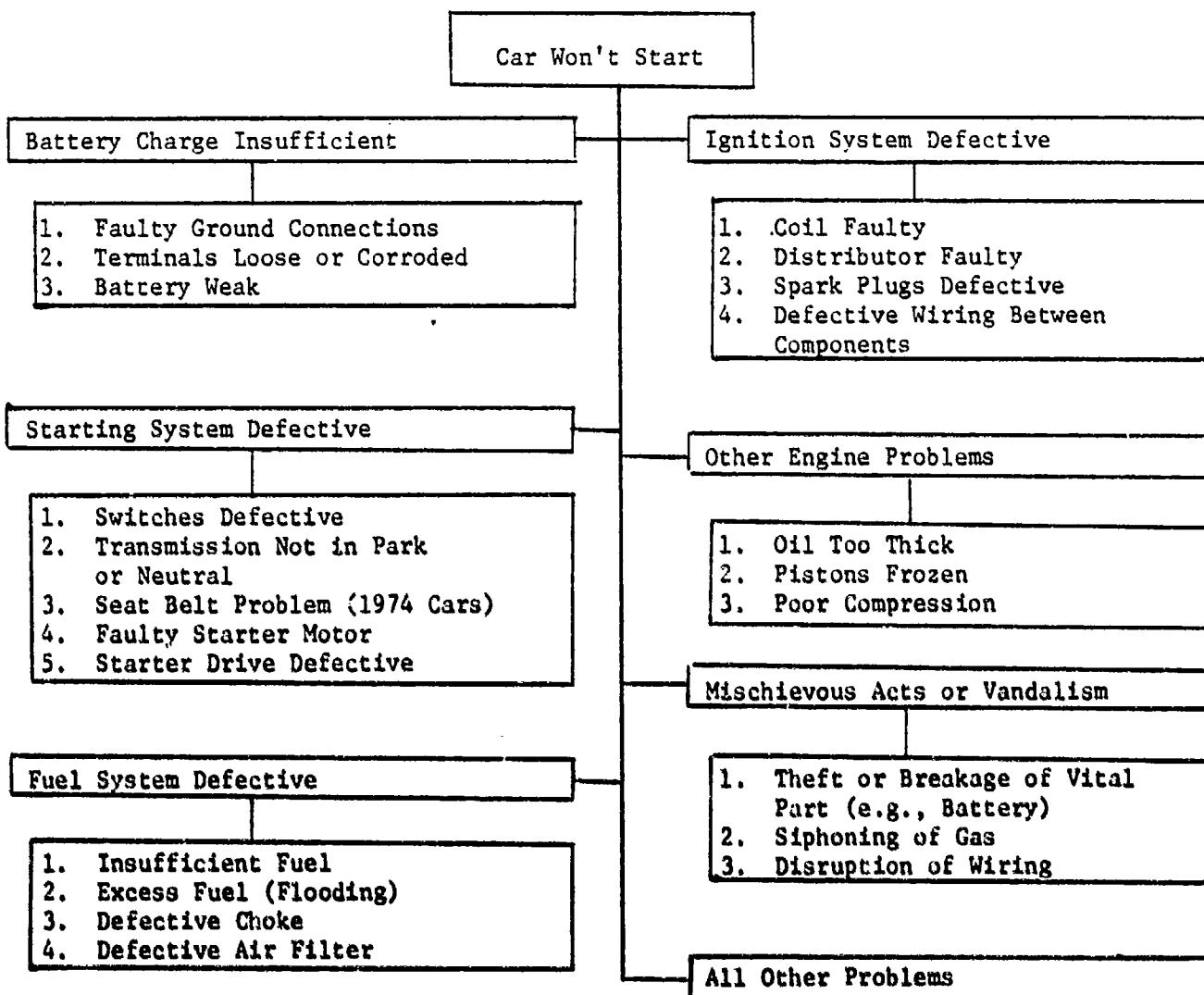


Figure 5

The "car won't start" fault tree in Figure 5 was shown to several groups of experienced mechanics.¹⁹ One group was shown the full tree and asked to imagine 100 cases in which a car won't start. Members of this group were then

asked to estimate how many of the 100 cases were attributable to each of the seven major branches of the tree, that is, to battery failure, ignition system failure, etc. A second group of mechanics was shown only an incomplete version of the tree; three major branches were omitted in order to test how sensitive the test subjects were to what was left out.

If the mechanics' judgment had been fully sensitive to the missing information, then the number of cases of failure that would normally be attributed to the omitted branches should have been added to the "Other Problems" category. In practice, however, the "Other Problems" category was increased by only half as much as it should have been, indicating that the mechanics shown the incomplete tree were unable to fully recognize and incorporate into their judgments the fact that some of the causes for a car not starting were missing from the fault tree. When the same experiment was run with non-mechanics, the effect of the missing branches was much greater.

As compared with most questions of intelligence analysis, the "car won't start" experiment involved rather simple analytical judgments. That the presentation of relevant variables in the abbreviated fault tree was incomplete could and should have been recognized easily by the experienced mechanics selected as test subjects. That the mechanics performed so poorly on this experiment suggests that intelligence analysts may have similar problems. Missing data is a normal characteristic of intelligence problems, and it is probably more difficult to recognize and incorporate the missing data in judgment in abstract intelligence problems than in the more concrete "car won't start" experiment.

Persistence of Impressions Based on Discredited Evidence

Impressions tend to persist even after the evidence that has created

those impressions is fully discredited. Psychologists have become interested in this phenomenon because many of their experiments require that the test subjects be deceived, for example, that they be made to believe they were successful or unsuccessful in performing some task or that they possess certain abilities or personality traits when this is not in fact the case. Professional ethics require that test subjects be disabused of these false impressions at the end of the experiment, but this has proven surprisingly difficult to achieve.

Students' erroneous impressions concerning their logical problem-solving abilities persevered even after the students were informed that manipulation of good or poor teaching performance had virtually guaranteed their success or failure.²⁰ Similarly, test subjects asked to distinguish true from fictitious suicide notes were given feedback that had no relationship to actual performance; the test subjects had been randomly divided into two groups, with members of one group being given the impression of above average success and the other of relative failure at this task. The subjects' erroneous impressions of the difficulty of the task and of their own performance persisted even after they were informed of the deception, that is, informed that their alleged performance had been preordained by their assignment to one or the other test group. Moreover, the same phenomenon was found among observers of the experiment as well as the immediate participants.²¹ The impressions persisted even after the evidence on which they were based was fully discredited.

There are several cognitive processes that might account for this phenomenon. The previously mentioned tendency to interpret new information in the context of pre-existing impressions is relevant here but probably not sufficient to explain why the pre-existing impression cannot be eradicated even

when the new information authoritatively discredits the evidence on which it is based. An interesting but speculative explanation draws on the strong human tendency to seek causal explanations.

When evidence is first received, it is perceived within a context that implies causal connections between the evidence and some antecedents that explain the evidence. The stronger the perceived causal linkage between the evidence and its antecedents, the stronger the impression created by the evidence. Thus in the experiment with suicide notes, one test subject attributed her apparent success in distinguishing real from fictitious notes to her empathetic personality and the insights she gained from the writings of a novelist who committed suicide. Another ascribed her apparent failure to lack of familiarity with people who might contemplate suicide. Even after learning that the feedback concerning their performance was invalid, these subjects retained this plausible basis for inferring that they were either well or poorly qualified for the task. Thus their initial impressions of task difficulty and of their own ability remained unchanged.²²

In more general terms, when evidence is received, we postulate a set of causal connections that explains this evidence. Even though the evidence may subsequently be discredited, the causal linkages remain plausible and may be seen as sufficient to imply the existence of an event even in the absence of the now-discredited evidence. The previously perceived causal linkage comes easily to mind. It is a readily "available" (note previous discussion of availability bias) explanation that makes the event seem more likely than it would have appeared prior to receipt of the discredited evidence.

Implications for Deception

The bias favoring a small amount of consistent information over a large

body of less consistent data supports the common maxim in deception operations that the deceiver should control as many information channels as possible in order to reduce the amount of discrepant information available to the target. Deception can be effective even with a small amount of information as long as the target does not receive contradictory data. Not only should the notional picture be consistent, but the deceiver should actively discredit the real picture as well. To achieve maximum consistency, it is necessary to discredit the true as well as build up the false.

To deception planners, the "car won't start" experiment suggests that deception is unlikely to fail because of information that is not provided. The absence of evidence is often overlooked, so errors of omission will be less serious than errors of commission. Conversely, the analyst attempting to detect deception would be well advised to consider carefully what information is missing. If the enemy were planning X, what would be the observable consequences of this plan, what is the likelihood this evidence could in fact be observed, and what inferences should be drawn from the fact that certain evidence is not observed?

Neither of the above conclusions is at all surprising. The persistence of impressions based on discredited evidence, however, does have counter-intuitive implications. The impressions created by information fed through a double agent may persist even after the opposition learns that its agent has come under control and that information from this source cannot be trusted. If we give credence to information and it affects our thinking and we subsequently learn that this information was deliberately leaked by an enemy, this subsequent knowledge does not necessarily reduce the impact of the initial report. Once information rings a bell, so to speak, the bell cannot be "unrun."

The ambiguity of most real world situations contributes to the operation of this perseverance phenomenon. Rarely in the real world is evidence so thoroughly discredited as is possible in the experimental laboratory. Assume, for example, that you receive a report that an intelligence agent you run has come under hostile control. Assume further that you have formed a number of impressions on the basis of reporting from this agent. It is easy to rationalize the perseverance of these impressions by arguing that the information was true despite the agent being under hostile control, or by doubting the validity of the report claiming the agent is under control. In the latter case, the phenomenon of impression perseverance may itself affect evaluation of the evidence that supposedly discredits the impression; it is because we retain our initial impression that we disbelieve the new evidence.

It is a truism that security is an essential element of successful deception. If the deception is undertaken to protect the security of an operational plan, compromise of the deception might be worse than no deception at all, for it could attract attention to the true plan. While security is obviously desirable, it may not be quite as essential as past deception planners have believed, for there are cognitive factors that help reduce the adverse consequences of security leaks. The persistence of impressions based on discredited evidence is one of these. Others dealing with the human capacity to rationalize contradictory evidence have been discussed in the perceptual biases section. There is empirical evidence to support this conclusion. Of the 63 cases of strategic surprise or deception studied by Barton Whaley, none had perfect security. Some more or less specific warnings were present in every case, yet surprise

or deception was successful nonetheless.²³

BIASES IN THE PERCEPTION OF CAUSALITY

We cannot see causation in the same sense that we see a desk or a tree. Even when we observe one billiard ball strike another and then observe the previously stationary ball begin to move, we are not seeing causation. The most we can see is the juxtaposition of events in time and space. The perception of causation results only from a complex process of inference, not from direct observation. As other forms of inference, it is subject to systematic biases. The two biases discussed in this section increase the likelihood that analysts will perceive deception when it is not in fact present.

Bias Toward Causal Explanations

We have a deep psychological need to understand our environment. Understanding implies order, so we arrange our observations into regular patterns and relationships. Happenings that we cannot understand may be attributed to God's will or to fate, which is somehow preordained, for we resist the thought that outcomes may be determined by forces that interact in random, unpredictable ways. People generally do not accept the notion of chance or randomness. Even dice players behave as though they exert some control over the outcome of a throw of dice.²⁴

Because of this need to impose order on our environment, we may seek and see patterns that actually are not there. Some recent research in paleobiology seems to illustrate this tendency. A group of paleobiologists has developed a computer program to simulate evolutionary changes in animal species over time. But the transitions from one time period to the next

are not determined by natural selection or any other regular process; they are determined by computer-generated random numbers. The patterns that are produced by this program are very similar to the patterns in nature that paleobiologists have been trying to understand. Events that seem, intuitively, to have a very strong pattern, were in fact generated by random processes.²⁵ This suggests that there may, in fact, be no valid causal explanation of evolution.

B.F. Skinner noted a similar phenomenon in the course of experiments with the behavioral conditioning of pigeons. The normal pattern of these experiments was that the pigeons were given positive reinforcement, in the form of food, whenever they pecked on the proper lever at the proper time. To obtain the food regularly, they had to learn to peck in a certain sequence. Skinner demonstrated that the pigeons "learned" and followed a pattern even when the food was actually dispensed randomly.²⁶

These examples suggest that in military and foreign affairs, where the patterns are at best very difficult to fathom, there may be many events for which there is no valid causal explanation. Our bias against randomness as an explanation may cause us to impose a pattern on these events so that we see causal relationships that are not in fact there. It clearly does not do much for our ego as analysts to admit that some of the things we are called upon to explain might be caused by random processes such as the random numbers used in the paleobiologists' computer program. And it is certainly unlikely that the customers for our intelligence would appreciate such an explanation, so there are motivational biases that reinforce the cognitive bias favoring order over randomness.

The need to perceive order and reason in the world around us causes

us to overestimate the extent to which other countries or other people are pursuing a coherent, rational, goal-maximizing policy. We tend to see the actions of other governments as the intentional result of central direction and planning, and to overlook the fact that the same behavior might be more accurately explained by accident, blunder, the unintended consequence of well-intentioned policy, improperly executed orders, bargaining among semi-independent bureaucratic entities, or following standard operating procedures under inappropriate circumstances.

Internal vs. External Causes of Behavior

Attribution theory is a sub-field of psychology dealing with how we assess the causes of behavior. Most research in attribution theory employs a basic dichotomy between internal and external causes of behavior. Internal causes include a person's attitude, beliefs and personality. External causes include such factors as incentives and constraints, role requirements, or difficulty of a task. Attribution theory examines the circumstances under which we attribute behavior to either internal or external causes. Such differences in attribution may have significant consequences for behavior, as our response to friendly or unfriendly actions of other persons may be quite different if we attribute the behavior to the nature of the person than if we see the behavior as resulting from situational constraints over which that person had little control.

The fundamental attributional error is to overestimate the importance of personal traits and dispositions in determining behavior. When we observe another's behavior, we are too quick to infer broad personal qualities or dispositions from this behavior and to expect that these same dispositions will determine the actor's behavior in other contexts. The so-

called "Peter Principle" is a simple illustration of this bias. An employee is promoted to his or her level of incompetence because the supervisor attributes the employee's promotion-meriting performance exclusively to personal ability and assumes that this personal characteristic will continue to determine performance despite changes in the situational context. Much research into personality traits, however, shows that personal traits are not consistent determinants of behavior; which trait predominates at any given time is heavily dependent upon the situational context in which the behavior takes place.

Most interesting for our purposes, however, is that susceptibility to this attributional error depends upon whether we are examining our own behavior or observing the behavior of others. We tend to attribute the behavior of others to the nature of the person, while we see our own behavior as conditioned by the nature of the situation in which we find ourselves.²⁷

This bias is partially explained by differences in information available to actors and observers. In evaluating our own behavior, we compare our present behavior with our own past behavior in similar or different contexts. This past behavior is well known to us, so it is easy to compare the impact of different situations on our behavior over time. This causes us to focus on the nature of the situation as the principal variable explaining differences in our own behavior. The observer of another person, on the other hand, typically lacks this depth of knowledge of the other person's behavior in other circumstances. So the observer's orientation is to examine how the actor's behavior compares with the behavior of other persons under similar circumstances. This prompts a focus on the nature of the person rather than on the nature of the situation. Other

differences in perspective between actor and observer may also contribute to this bias.

I know of no experimental evidence that this bias applies to our perception of the behavior of countries as well as the behavior of individuals, but such an extrapolation seems plausible and is supported by personal experience. Reportedly one of the persistent differences between intelligence analysts responsible for the Soviet Union and those responsible for China and working on Sino-Soviet relations is this: Soviet analysts tend to attribute Chinese behavior to the nature of the Chinese, while they see Soviet options as circumscribed by many situational constraints. Chinese analysts tend to take the opposite view, that is, that the Russians behave like Russians while Chinese actions are the product of the situation in which the Chinese find themselves.²⁸

Thus familiarity, either with oneself or the country for which one is responsible, produces empathy and understanding, and attribution of behavior to external circumstances rather than to the nature of the actor. Lack of information concerning the past behavior and current circumstances of an actor, or lack of empathy for whatever reason, causes us to perceive that actor's behavior as stemming from the nature of the actor. As with all the cognitive biases, we are describing a tendency, not a black and white rule that applies to all people in all cases. In assessing the behavior of others, we normally do make some allowance for situational pressures and role requirements, but this allowance is often insufficient.

A principal implication for international relations is that this bias sows the seeds of mistrust and misunderstanding, as countries have quite different perceptions of the causes of each other's behavior. There are also

several corollaries and related biases that are quite relevant to the analysis of international affairs.²⁹

When we fall prey to the attributional bias of judging another country's behavior to be more heavily influenced by the nature of the people or the leaders than is in fact the case, we tend to perceive this state as more hostile than it really is. If actions that adversely affect our interests are attributed to the predispositions and attitudes of the other country, we perceive these actions as expressing hostility. If, however, the other nation's actions are actually responsive to situational constraints, it is unnecessary to assume hostile intent. Similarly, attribution of behavior to personal or national characteristics and the assumption that these characteristics are consistent over time leads to the perception of behavior as inflexible and unchanging. Conversely, to the extent that behavior is attributed to external circumstances, it is perceived as flexible and subject to influence by our own actions.

Implications for Deception

Deception planners need to avoid these biases relating to causality in order to evaluate accurately the situation in which they find themselves and to estimate how a target is likely to respond to whatever information is provided. But the most direct relevance of these biases to the question of deception is their impact on the analyst seeking to detect and avoid deception. Both biases tend to make analysts perceive deception when it is not really there.

Deception is an example par excellence of a policy that is centrally directed, well planned, and highly coherent and rational. As a causal explanation, deception is intrinsically satisfying precisely because it is so orderly and rational. When other persuasive explanations are not avail-

able (perhaps because the phenomena we are seeking to explain were actually caused by mistakes, failure to follow orders, or other factors unknown to us), deception offers a convenient and easy explanation. It is convenient because intelligence analysts are generally sensitive to the possibility of deception, and its detection is often taken as indicative of sophisticated, penetrating analysis. It is easy because almost any evidence can be rationalized to fit the deception hypothesis; in fact, one might argue that once deception has been raised as a serious possibility, this hypothesis is almost immune to disconfirmation. While deception is by no means an uncommon phenomenon, I suspect that our bias toward seeing events as part of an orderly pattern leads us to perceive deception more frequently than is warranted.

This tendency to perceive deception is reinforced by the bias toward perceiving the behavior of others as caused by the nature of the person rather than by situational constraints. When another person or government employs deception, we commonly (although perhaps erroneously) consider this decision to stem primarily from the nature of the person or government rather than the nature of the situation in which this person or government finds itself. It is satisfying to attribute deviousness and malevolence to our enemies. And if they are devious and malevolent, of course they will engage in deception. Deception is "them" acting, not just responding to events. When we observe activity that we do not otherwise understand, deception may be a more attractive explanation than to simply admit that we have insufficient information or understanding of the situation.

Our recollection of the many cases in which deception has proven successful makes us think we should be more rather than less sensitive to the possibility of deception. But the fact that deception is generally success-

ful does not mean people are insufficiently disposed to perceive it, or that increased alertness will protect us from being taken in. Deception is generally successful despite our predisposition to perceive it, not because of any tendency to overlook this possibility. As we shall see shortly, greater alertness to deception increases our vulnerability to the most common form of deception. To determine whether governments tend to be oversensitive to deception or not sensitive enough, it is insufficient to look only at the many cases in which countries have been deceived. It is equally necessary to examine cases in which they have perceived deception erroneously. Such cases may be equally common but are seldom documented as they are intrinsically less interesting to historians.

CONCLUSION

We have examined a number of perceptual and cognitive biases and their implications for strategic deception and counterdeception. For quick reference, the biases and their implications are summarized in tabular form in the Appendix. Three primary conclusions emerge from this examination.

1. Perceptual and cognitive biases strongly favor the deceiver as long as the goal of deception is to reinforce a target's preconceptions or to simply create ambiguity and doubt about the deceiver's intentions. Under these circumstances, which are by far the most common forms of deception,³⁰ the deceiver clearly holds most of the cards. If the situation is such that the deceiver can achieve planned goals only by changing the target's preconceptions, however, the target is shielded by many of the same perceptual and cognitive biases that otherwise work to his or her disadvantage.

2. While security is obviously desirable for any deception plan, perfect security is rarely attained and deceptions succeed without it. When the deception is planned to reinforce preconceptions, the target's ability to rationalize discrepant information tends to offset security leaks and uncontrolled channels of information.

Even after a source of information has been discredited, impressions created by the information from that source tend to persist.

3. Analysts are generally predisposed to perceive deception. Instances of successful deception are far easier to recall than cases in which deception was not employed under similar circumstances, and this sensitizes us to the possibility of deception. We are attracted to deception as an explanation for otherwise incongruous events because the deception explanation enables us to impose order and reason on a disorderly world, and because it enables us to attribute deviousness and malevolence to our enemies. These factors sometimes cause us to perceive deception when it is not really present.

One might think that the analysts' predisposition to perceive deception would offset the advantages we have attributed to the deceiver, but such is not the case. Deception is generally successful despite the target's alertness. According to Barton Whaley's analysis of 68 cases of strategic surprise or deception between 1914 and 1968, deception was successful in 91% of the cases in which it was attempted.³¹ As in so many other fields, major advantages accrue to the actor who seizes the initiative, rather than to the reactor who seeks to parry the initiatives of others. Whaley's finding highlights the unavoidable position of the intelligence analyst seeking to

avoid being deceived, and the remainder of our conclusion is devoted to a closer look at the analyst's plight and what might be done to alleviate it.

The fundamental problem involved in avoiding deception, and avoiding intelligence surprise in general, is the problem of determining when to change our mind in response to new information that does not jibe with our current conception. If we are unreceptive to new information, we cannot learn from experience or keep abreast of changing circumstances and situations. If we are too receptive, we are unduly influenced by the most recent report or the latest short-term trend. There is no magic formula that tells us when to discount discrepant evidence and when to revise our thinking to take it into account. But as a general rule, we err more often on the side of being too wedded to our established views and thus too quick to reject information that does not fit these views, than on the side of being too quick to revise our beliefs. Thus, most of us would do well to be more open to evidence and ideas that are at variance with our preconceptions.

In his study of surprise attacks, Abraham Ben-Zvi identified two kinds of information on which estimates of impending conflict might be based - strategic assumptions and tactical indicators.³² Examples of strategic assumptions include the U.S. belief in 1941 that Japan wished to avoid war at all costs because it recognized U.S. military superiority, and the Israeli belief in 1973 that the Arabs would not attack Israel as long as they lacked sufficient airpower to secure control of the skies. Such preconceptions are based on a large body of interrelated evidence and have usually been held for a long time. Tactical indicators are the specific reports concerning preparations or intent to initiate hostile action, or

more generally, specific evidence from current events that indicates the direction in which events are moving. This distinction between strategic assumptions and tactical indicators is very similar to the distinction we have been making between pre-existing beliefs and new information.

Ben-Zvi studied five cases of intelligence failure to foresee a surprise attack: Pearl Harbor, German attack on the Soviet Union in 1941, Chinese intervention in the Korean war, Chinese attack on India in 1962, and the Arab attack on Israel in 1973. He found that in each case tactical indicators of impending attack were present but were discounted because they conflicted with analysts' and policy makers' preconceptions.* The strategic assumptions were not revised in the light of the increasing flow of contrary tactical information. Ben-Zvi argues that whenever strategic assumptions of intention to attack and tactical indicators of impending attack converge, an immediate threat is perceived and appropriate preparations are made. But when there is a divergence between strategic assumptions and tactical indicators, the strategic assumptions always prevail. Thus despite the evidence of preparations for an attack, the actual attack comes as a "surprise," as in the five cases analyzed. Ben-Zvi concludes that tactical indicators should be given increased weight in the decisionmaking process.

This may well be appropriate advice. It certainly accords with our conclusion that people err most often by being too quick to reject new information that does not conform to their preconceptions. But Ben-Zvi does not consider cases in which alarming tactical indicators have been properly discounted as maneuvers, bluff or deception rather than as indicators of impending attack. Ascribing more weight to tactical indicators in all

* CIA post mortems on cases of intelligence failure have also found that information that would have permitted an accurate assessment was generally available, but that this information assumed significance only with the benefit of hindsight.

cases will increase the frequency of false alarms, and this too entails costs. While we should in general be more open to changing our minds as a result of discrepant tactical or other information, in any single case it is impossible to know a priori whether we should revise our estimate or stick with a long-established view.

Alertness to the possibility of deception can influence the degree of one's openness to new information, but not necessarily in a desirable direction. The impetus for changing one's estimate of the situation can only come from the recognition of an incompatibility between a present estimate and some new evidence. If people can explain new evidence to their own satisfaction with little change in their existing beliefs, they will rarely feel the need for drastic revision of these beliefs. Deception provides a readily "available" explanation for discrepant evidence; if the evidence does not fit one's preconceptions, it may be dismissed as deception. Further, the more alert or suspicious one is of deception, the more readily available is this explanation. Alertness to deception presumably prompts a more careful and systematic review of the evidence. But anticipation of deception also leads the analyst to be more skeptical of all the evidence, and to the extent that evidence is deemed unreliable, the analyst's preconceptions must play a greater role in determining which evidence to believe. This leads to a paradox: the more alert we are to deception, the more likely we are to be deceived.

Actually, this paradox applies only to the type of deception in which the deceiver's goal is to exploit and reinforce our preconceptions. If the deceiver's goal is to sow confusion or make us change our mind, it will be to our advantage to ignore the evidence and stand by our preconceptions.

The problem of how to detect deception is not generically different from other common problems of intelligence analysis. It is, for example, very similar to the general problem of early warning. From a cognitive perspective, there are no prescriptions that apply uniquely to the deception problem. Consideration of ways to improve our ability to detect deception is a part of the much broader problem of improving intelligence analysis in general.

While cognitive psychology does not provide direct insights on how to detect deception, it can be of indirect assistance. By better understanding how our mind processes information, including the diverse perceptual and cognitive biases to which we are subject, we can hope to compensate for some of these basic problems in human information processing. We can identify situations in which our normal faith in our impressions should be suspended, and in which some more systematic means of handling the evidence may be appropriate. We can also identify guidelines concerning the types of analytical methods that may be most useful in supplementing intuitive judgment.

A common factor in cases of successful deception, and in most cases of intelligence surprise in general, is that analysts have become fixed in a mind set that does not respond effectively to discrepant information. Thus methods for breaking mind sets are particularly relevant to the problem of detecting deception. This includes such practices as competitive analysis, use of a devil's advocate to analyze alternative scenarios, interdisciplinary brainstorming and other techniques that facilitate the identification and analysis of alternative hypotheses.

Current research suggests that people perform poorly at generating

a full set of hypotheses.³³ If the correct hypothesis is not even formulated for consideration, there is clearly little chance of making an accurate estimate. Formation of alternative hypotheses and identification of the indicators and observables associated with each hypothesis helps direct an economical search for information. The hypotheses also serve as an organizational structure for storage and recall of information in memory.

There is a strong tendency to view the significance of evidence in terms of the degree to which it supports, contradicts or seems irrelevant to what we already believe to be the case. We overlook the fact the evidence we think of as supporting our case may also be quite consistent with several alternative hypotheses, so we draw from the evidence false confirmation of our pre-existing beliefs. We can avoid this by evaluating the evidence in terms of its diagnosticity in helping revise our estimates of the relative likelihood of each hypothesis.

As we saw in the old woman-young lady experiment, it is difficult to look at the same data from several different perspectives. Yet this is exactly what is required for the simultaneous evaluation of multiple hypotheses. Some sort of methodological aid is useful to facilitate this task, as an aid to memory and to help integrate the many probabilistic judgments that are required. There are a variety of computer programs available for this purpose,³⁴ but significant benefits might also be obtained by simple paper-and-pencil techniques.

Our intention in these final paragraphs has been to be suggestive, not prescriptive. Traditional, intuitive methods of analysis have not been sufficiently effective in detecting deception, so it is necessary to explore other alternatives. We have tried to point out some useful directions for

this exploratory effort, but a fuller discussion of analytical methodology goes far beyond the scope of this paper.

APPENDIX

REVIEW OF BIASES AND THEIR IMPLICATIONS FOR DECEPTION

BIAS	IMPLICATION
<hr/> <hr/> Perceptual Biases <hr/>	
We tend to see what we expect to see. It takes more information, and more unambiguous information to recognize an unexpected phenomenon than an expected one.	It is far easier to reinforce a target's existing preconceptions than to change those beliefs.
Perceptions are quick to form but resistant to change. Once we have formed an impression about an object, event or situation, we are biased toward continuing to perceive it in the same way.	It is far easier to reinforce a target's existing preconceptions than to change them. Ability to rationalize contradictory information may offset hazards of security leaks or uncontrolled channels.
Initial exposure to ambiguous or blurred stimuli interferes with accurate perception even after more and better information becomes available.	Impact of information can be affected by the sequence used in feeding it to a target.
<hr/> <hr/> Biases in Estimating Probabilities <hr/>	
We estimate probability according to how easily we can imagine an event or recollect instances of the event. Known as availability bias.	Because deception is more salient than absence of deception, analysts will believe deception is more common than it really is, and thus be more disposed to perceive it. Employees of watch offices will generally overestimate the probability of whatever they are watching for. This leads to the cry wolf syndrome that can be exploited by deception planners. Analysts seeking to avoid surprise should not make judgments based on availability.
We estimate probability by seizing upon some natural starting point as a first approximation, then adjust the estimate incrementally in response to new information or further analysis. Normally we do not adjust enough. Known as anchoring bias.	Because people do not revise their judgments enough as new information is received, it is easier to conduct a deception aimed at reinforcing the target's existing preconceptions than to change these beliefs.

In translating our subjective feelings of certainty into a probability estimate, we are generally overconfident about how much we know.

Overconfidence exacerbates the impact of all the biases, for if we are satisfied with our judgments we will make fewer efforts to improve them. An overconfident target is easier to deceive when the deception involves exploiting existing preconceptions.

Biases in Evaluating Evidence

We have more confidence in conclusions drawn from a small body of consistent data than from a larger body of less consistent information. We are oversensitive to consistency.

The deceiver should control as many information channels as possible to reduce the amount of discrepant information available to the target. Deception can be effective even with a small amount of information

We have difficulty factoring the absence of evidence into our judgments. The absence of information that would normally be available is often overlooked. "Out of sight, out of mind."

For the deception planner, errors of omission will be less serious than errors of commission. Analysts seeking to detect deception should analyze what inferences can be drawn from the fact that some evidence is not observed.

Impressions tend to persist even after the evidence on which they are based has been fully discredited. You cannot "unring" a bell.

The consequences of a security leak may not be as serious as might otherwise be expected.

Biases in Perceiving Causality

We are biased toward seeing events as part of an orderly, causal pattern. Randomness, accident and error tend to be rejected as explanations for observed events. We overestimate the extent to which other people or countries are pursuing a coherent, rational, goal-maximizing policy.

We are predisposed to perceive deception even when it is not really there. As a causal explanation, deception is intrinsically satisfying because it is so orderly and rational.

We tend to attribute the behavior of others to the nature of the person or country, while we see our own behavior as conditioned by the nature of the situation in which we find ourselves.

We are predisposed to believe our enemies will engage in deception. It is satisfying to attribute deviousness and malevolence to our enemies, and if they are devious and malevolent, of course they will engage in deception

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ON THE PSYCHOLOGICAL ANALYSIS OF COUNTERDECEPTION

Theodore R. Sarbin

My aim in this paper is to explore some ideas on the detection and identification of communications that are intended to influence the receiver to perform in ways that are advantageous to the sender. My agenda is as follows: first to consider the scientific approach to the detection of deception and other strategies; second, to examine whether the scientific paradigm has proven useful in the study of strategic interactions, and to question whether the assumptions underlying the scientific paradigm are appropriate to the study of deception and other strategies; and third to explore an alternative to the traditional models of scientific analysis; the emplotment of the narrative.

Many analysts of intelligence in their daily work no longer rely on scientific models to predict the political and military actions of an adversary. Nevertheless, various government agencies, including military and intelligence, encourage and financially support scientific organizations that have the mission of improving the practice and detection of deception and other strategies. It is expected, or hoped, that the scientific community would come up with formulae, equations, nomograms, etc., the better to predict the actions of an adversary. Although the research on communication and its management is directed to many problems, none of the problems is so critical as the development of tools and techniques to help determine whether a given set of signals from an adversary is to be classified as empirically valid (Does it mean what it says?) or invalid (Does it mean something other than what it says?). For example, in 1944, the German High Command had to predict the actions of the Allied Armies on the basis of a

large number of signals, the most salient being the Normandy landings. One of two interpretations had to be selected and acted upon; (a) the Normandy landings were what they appeared to be--the long awaited assault on the Continent, or (b) the landings were not what they appeared to be, but rather an action intended to divert troops held in readiness for an expected assault at Pas de Calais.

The traditional approach to scientific problems is to instantiate the particular set of circumstances as a member of a class and then to predict to the particular case from knowledge of the characteristics of the class. This is the method that Scheibe¹ has identified as sagacity. It assumes that a class can be constructed and the criteria of similarity can be established for the purpose of sorting communicative acts. That classes and criteria can be established is indubitable. Whether cases of the type illustrated above can be sorted into a class for the purpose of making predictions has not yet been established.

To predict from class membership means having available inductively-derived base rates. As I shall take pains to point out presently, the use of base rates is rational when occurrences are repetitive and where predictions are expected to be in error proportional to the prior probabilities contained in the base rates.

THE PREDICTION PROBLEM

The basic problem for the strategist and the analyst of strategy centers on the ability to predict the actions of an adversary. Whether the target is a singular person, a group such as a football team, a military unit, or a political entity, one's chances of gaining or holding an advantage are

proportional to the ability to predict the conduct of the adversary. To the extent that predictions are valid, to that extent does the actor have the edge in any competitive situation. His own strategic plans will take into account the predicted actions of his adversary.

The study of the prediction of behavior has an interesting history. Although prophecy is probably as old as civilization, it was not until the 1920's that social scientists applied statistical methods to problems the better to increase the reliability and validity of their practices. For example, sociologists and penologists raised the question: how can we increase the accuracy of forecasting the behavior of paroled felons? At about the same time, the military establishment sought methods for increasing the effectiveness of their selection procedures. In the 1930's the problem of predicting outcome of college-going became a well-worked problem. The question was phrased: how to predict success or failure on parole, in the army, in the university, etc.? Applicants for flight training, for example, could be screened beforehand on the basis of prediction tables. Those applicants for whom failure was predicted would be rejected and expensive training programs could be reserved for those for whom the predictions were favorable.

Borrowing the statistical methods that had been used by life insurance actuaries, social scientists constructed equations and prediction tables to predict outcomes of parole, military training, and higher education. Later, the methods were employed in medical and psychiatric settings.

The psychology of prediction has been elaborated by a number of authors, among them Horst², Sarbin³, Mehl⁴, Sarbin, Taft and Bailey⁵, Kahneman and Tversky⁶ and others. The earlier work focused on the problem of how to

improve, through the intervention of a human judge, clinician, or analyst, predictions made on the basis of prior probabilities.

The general form of the statistical prediction can be illustrated as follows:

70 percent of persons with characteristics X, Y & Z succeed in a given outcome; Jones has characteristics X, Y, & Z. Therefore, Jones has a 70 percent chance of success. (An alternate way of stating the conclusion is: The statement "Jones will succeed" has a credibility of .7.)

Implied in the use of prior probabilities or base rates is the assumption of a stable world, the assumption of "the continuity of nature," so that prior probabilities constructed last year will be applicable this year.

The use of the syllogism is often unrecognized as the cognitive model for predicting the actions of persons. (Or for that matter, for predicting the weather.) The illustration above is a "probabilified" version of syllogistic reasoning. The quantified major term is a more precise way of writing the major term in the major premise. In formal logic, the premise would be written "Some M are P," or "Some persons with characteristics XYZ succeed in a given outcome." Even though "some" is translated to a proportion, the logical problem remains: no determinate prediction can be made about Jones. No conclusion is permissible when the major premise is qualified by "some."

The statistical inference model, outlined above, arose as an adaptation of logical inference. The syllogisms of Aristotle reflected the accumulated wisdom of the ancients on how to solve problems, i.e., how to think. If syllogisms of the form All X are Y or No X is Y were sufficient to deal with the exigencies of human existence, no modification of the rules of syllogistic inference would be necessary. But most human situations, when

translated into the language of propositions and premises, are described without the categorical All or None. Human beings must solve problems from premises of the form: Some X are Y, or Some X are not Y. This type of syllogism may be illustrated: Let us consider a class of deceptions, D. Success in confounding the adversary is indicated by S.

Some D are S.

The strategist entertains a plan to employ Z, a deception of type D.

The minor premise becomes: Z is an instance of D.

Now the question: will Z, this instance of D, succeed or fail? Clearly, no valid conclusion is possible. Z may be a member of the "some" class that succeeds or of the "some" class that fails.

Suppose, following Whaley⁷, an interested observer collected a series of cases in which D was employed and organized the data according to the base rate formula

$$\frac{\text{Number of Successes}}{\text{Number of successes} + \text{number of failures.}}$$

Over a period of time, let us say, he collects 100 cases, 70 of which resulted in success (from the point of view of the deception planner) and 30 in failure. The qualifier in the major premise, "Some," is now quantified and may be written

70 percent of D are S.

Collocating with the minor premise,

Z is an instance of D,

does not remove the ambiguity from the syllogism. However, with the addition of the probabilistic token, one could construct the following conclusion: The probability that this particular instance of D will succeed

is .7. In the hypothetical case, a deception planner who employed D a large number of times would be able to report success 70 percent of the time and failure 30 percent of the time. The statistical (actuarial) method merely applies a formula or prediction table constructed from inductively derived base rates.

In situations where extremely high stakes are at risk, the statistical formula may be perceived as inadequate, if not dangerous. In nonmilitary situations such as prediction of the outcome of parole, or admission to a training program, or medical diagnosis, the use of base rates has been declared inefficient because a certain predictable portion of the population is assigned to false positive or false negative categories. From the point of view of the individual who is assigned to a false positive or false negative category, the criticism is usually stated in value terms, i.e., the method is unfair or unjust.

The charge of inefficiency of the base rate method is a relative one. The penologist is not satisfied with the application of prediction tables because he might recommend the release on parole of a felon whose post-prison behavior would assign him to that class of cases that recidivated. On the other hand, the profits of life insurance companies amply demonstrate the utility of the actuarial approach in predicting death rates. If one is willing and able to accept the inevitability of the costs of false positive and false negative predictions, the actuarial method has no peer. Such costs are regarded as necessary and tolerable in predicting, for example, achievement in college, success in training programs, etc. When dealing with life and death issues, or with decisions with far-reaching personal or community implications, inductively-derived base rates

that do not approach 0 or 1 are perceived as inappropriate and even improper. It is clear from reading the history of diplomacy and warfare that political leaders and military strategists ply their craft by predicting the conduct of adversaries. Whether stated explicitly or not, they cannot make a prediction involving high stakes on the basis of an invalid conclusion drawn from a major premise of the form Some X are Y.

To counter the criticism of inefficiency or unfairness, a method had to be devised that would improve on the base rates. For this purpose, the clinical method came into use. Sometimes called the intuitive method, the case study method, or individual mode of prediction, the clinical method require the analyst to make a prediction on the basis of data that allow tinkering with, or even ignoring, the base rates for individual cases.

A description of the clinical method of prediction is pertinent to the problems of strategic interaction. The deception planner, for example, is reluctant to develop a course of action on the assurance that it will be successful 7 times in 10. In the first place, when operating in a high stakes situation, (e.g., the possible loss of a fleet, a division, a critical engagement) extrapolation from base rates is not enough. In the second place, the deception analyst on the other side will have access to the same inductions. The deception analyst, operating under conditions of uncertainty, looks for inputs that will assure a modification of the probability statement toward 0 or 1. In so doing, he will utilize whatever information he has available, some of which may already be contained in the variables of the prediction equation. When he uses additional inputs he will do so by assigning such inputs to a class of events that are assumed to be related to successful deceptions. That is to say, he may take events

with known prior probabilities--probabilities based on induction--and modify them on the basis of assumed and untested prior probabilities. His assumptions follow from the recognition that each case is unique.

An example from the prediction of college achievement will illustrate the use of the clinical method of prediction. On the basis of two easily obtained measures, score on a college aptitude test (CAT) and rank in high school graduating class (HSR) the prediction of academic success of entering freshmen was made. Let us say that the correlation coefficient for the statistical method was .45. That is, predictions from the inductively derived regression equation based on CAT and HSR had a modest correlation with actual achievement (college grades). Applying the clinical method, college psychologists made predictions as if each case were unique. The clinical prediction was made "intuitively," presumably by the two predictor variables and a mass of information gathered in a clinical interview conducted before the student attended any classes, and other data which included a preliminary interviewer's data sheet and impressions, additional aptitude test scores, a structured autobiographical form, and, of course, the impressions and information gathered during the clinical interview. While commonsense expectations would favor the hypothesis that the large amounts of clinical data together with the clinician's freedom in combining and weighting the information would increase the accuracy of prediction, in fact, the accuracy was decreased, the correlation coefficient being .35. From their increased knowledge of each case, the clinical predictors altered the weights assigned by the base rate formula. In the sample under consideration⁸ the difference between the two coefficients was not statistically reliable.

Numerous studies have been conducted over the past 40 years in which predictions from inductively derived data are compared with predictions made by experienced clinicians, diagnosticians, case workers, management specialists, etc. The returns are uniform. Whether working in medical, prison, employment, psychiatric, or educational settings, the clinical predictions are never better, and frequently worse, than the actuarially derived predictions.⁹

The experience of comparing predictions from extrapolating base rates with predictions made without the confining controls of prior probabilities has not given us much to go on in our search for a model to study and to predict the strategic behavior of an adversary. Even where the intuitive predictor regards his task as that of predicting for the unique individual, the retrospective analysis shows that his error rate is as large as, or larger than predictions made from prior probabilities.

A number of investigators have tried to penetrate the reasons for systematic error in prediction, among them Hammond,¹⁰ Kahneman and Tversky,¹¹ and Nisbett et al.¹²

The findings of Kahneman and Tversky are especially pertinent to our discussion. In their experiments, subjects are asked to make probability estimates under various conditions. In general, they demonstrate that under conditions of uncertainty human beings ignore base rate information, even when it is available. Instead they make predictions on the basis of one or more "heuristics." One of these heuristics is representativeness. People make predictions on the basis of the degree that the outcomes to be predicted represent the salient features of the evidence on which the prediction is made. If a person is instructed to predict the occupation of a

target person, he will tend to be influenced by the information about the target person that is representative of stereotypes held by the predictor. Another heuristic is anchoring, the biasing effect of an initial judgment on subsequent judgments. A third is availability, the readiness to recall or imagine relevant instances.¹³ This heuristic would be similar to Bruner's notion of "access-ordering."¹⁴

For the most part, Kahneman and Tversky do not offer a theory to help account for their findings. The reader of their interesting experiments is most likely to conclude that people naturally have trouble in using probabilistic data, even under benign conditions.

The findings of Nisbett et al.,¹⁵ working from a somewhat different perspective, converge with the findings of Kahneman and Tversky. Nisbett and his collaborators assessed the responses of people to "consensus" information and discovered that such information, like base rates, tends to be ignored in making judgments. Their discussion offers a lead to a theoretical statement. Quoting Bertrand Russell that "popular induction depends upon the emotional interest of the instances, not their number,"¹⁶ they speculate that concrete, interesting information generates inferences because such information serves to recall or construct scripts, schemas, or stories. The chaining of inferences then follows the "well worn lines" of a familiar story or script. Abstract information, such as base rates and consensus data, are less rich in "potential connections to the associative network by which scripts can be reached."¹⁷ Both the Kahneman-Tversky studies and those reported by Nisbett and his associates lead to the conclusion that people tend to ignore the kinds of information that scientists, acting in their role as scientists, regard as pertinent and compelling. Other kinds

of information, logically and empirically remote from the solidity of base rates, become the cues for inferences, predictions, and actions. The reader of these reports, convinced that most human beings are less efficient than necessary in processing information, might well ask: what are the conditions that facilitate the downgrading and ignoring of solid information and the utilization of untested information?

Answers to this question must be sought from a number of perspectives. One of these, the origins and use of logical systems, allows a helpful restatement of the general findings. Whether operating under benign conditions or under conditions where the wrong prediction would lead to catastrophic outcomes, the ordinary person must operate with a major premise the major term of which is qualified by "some." Even if the syllogism is presented in quantified language, the actor makes the prediction with no warranty of certainty. He knows that acting upon such solid knowledge still carries a token of uncertainty and that the outcomes could be catastrophic.

It is at this point that the decision-maker employs the practical reasoning that lead Aristotle and others to formulate elegant rules for constructing syllogisms. Although most humans cannot recite the rules for valid inference, their life experiences provide a general schema which includes the rule for dealing with major premises that contain the qualifier "some." Without being analytic, a person "knows" that no valid conclusion is possible from such a premise. The case under scrutiny would be perceived as unique. In the interests of certainty, he directs his efforts to a search for premises and for cues that would allow the construction of a different premise, a premise presumably more suitable to unique events.

Many problems are involved in writing about unique events. To be sure, every event is unique in some way. Some events, however, share enough features with others that it is possible to construct a class. For the class to serve as a reliable aspect of one's problem solving requires that it be relatively context-free. But no human is entirely free of contextual influences which accounts for the high frequency of premises with the qualifier, "some." Where the magnitude of the cost of failure is catastrophic and the benefit of success is stupendous (historical turning points), we can begin to think of such events as having unique properties, especially where knowledge of the success or failure of a putatively similar case is part of the context in which the decision about a new case is being made by both the strategist and the counter deception analyst.

I refer again to the Normandy landings. This was part of a larger strategic plan, Operation Bodyguard, designed to influence the deployment of Axis troops. The course of the political history of the world was changed by the outcome, and this conclusion was entertained as a hypothesis by both adversaries. Subsequent historical analysis supports the view that the adversaries assigned the highest outcome value to their respective strategic plans. The Bodyguard strategy was a turning point, and for this reason must be considered a unique event. The second feature that would allow the description "unique" is the dependency of the event on context. The economic, political, climatic, and technological conditions of June, 1944 cannot be reproduced, nor even approximated. Further, the strategic plans of both adversaries are now public knowledge. Such knowledge is a strand in the texture of events that would be colligated into the construction of a class. Such hindsight information was of course not a part of the context for the 1944 planners and analysts. The specification of

context for strategic actions must be continually renewed. A particular class of strategic actions at time₂ will have different contextual characteristics than at time₁ as the result of the employment of exemplars of the class during the interval between t₁ and t₂. Generalizations made at t₁, applied to events at t₂, are therefore unwarranted.

At this point we are in a quandary: since people are inclined to ignore solid but probabilistic information, since neither statistical nor clinical prediction is appropriate to the unique case, and since strategic deceptions may be regarded as unique events, how can we discover or invent a model that would in principle facilitate the prediction of unique events, such as the Normandy strategy? A brief recapitulation is in order before I attempt an answer to the question:

A distillation of the review of the prediction problem accents the commonly held belief that unique events are unpredictable. When we confront reference cases that contain grand outcomes, such as Operation Bodyguard, we are forced to conclude that the valuable work on statistical and intuitive prediction provides no foundation for a model to help plan or detect strategic deceptions. A paradigm asserting causality is not applicable to the study of unique events. Unwarranted is the expectation that the science of psychology and related sciences would clear the way for constructing a usable model of strategic interactions. On analysis it appears that the scientific orientation is simply not applicable. We must consider a method drawn from sources other than contemporary science, sources that are free from the requirement of machine-like causality.

At this point, I prepare the reader for an unconventional approach to the complex task of seeking a metaphor to serve as a guide to unravel the strands of the unique case.

CAUSALITY AND THE UNIQUE CASE

We have all been influenced by a notion of causality that has its modern roots in the work of Newton and subsequent generations of scientists. That other ways of accounting for events are possible comes as a surprise to many analysts of human and natural events. The modern scientist--physical or social--cannot imagine a world bereft of causality.

In everyday speech and in the language of science, causality is regarded as a granted category. In considering the world of relatively stable objects, we are habituated to describing happenings in terms of antecedent happenings. We are familiar with the metaphysic of a clockwork universe. We have been raised on the causality of pushes and pulls, levers, wheels, screws, force, and so. Observations can be repeated and causal relations noted and confirmed. The popularization of psychology has influenced people to seek causal attributions (often to support the assignment of blame to others).

The utility of the root metaphor of the transmittal of force has given warrant to the long forgotten transformation of the metaphor of the machine to the status of an unquestioned given, i.e., a myth. Scientists concerned with human and social problems have sought to mimic the physical scientists in providing functional relations of the form: given stimulus conditions X, the response B is the inevitable consequent. Such functional relations have not been firmly established in the sciences dealing with human relations, save for trivial situations. A large error term remains after the causal relationships have been described as tendencies, probabilities, etc. The myth of the machine is kept viable and whole by explaining error as the result of the imprecision of measurement or of inadequate sampling. When the observations yield only probabilistic rather than determinate

relationships, the disclaimer is often expressed or implied that the error term might be reduced, perhaps to zero, with increased sophistication in methodology and sampling.

An alternate metaphysic, contextualism, does not require the causality principle of mechanistic science. The root metaphor of contextualism¹⁸ is the historic event in all its complexities. This alternate approach to human knowledge and action has not been a feature of the scientific enterprise partly because its categories do not fit the causality requirements of mechanistic science and partly because its home is in an alien province--the humanities, notably history and literature.

Contexts make a difference. Events are subject to change. Novelty is expected. Stimulus condition A in context M will influence behavior in one direction, in context N in another. Human beings carry on their commerce with each other and with the world of nature episodically. The episode, or the scene, is, in addition to being multifaceted, a changing scene. In spite of attempts by several generations of psychologists to employ the machine as the root metaphor of science, as a way of conceptualizing human beings, the imperious fact of novelty and change (and unpredictability) has frustrated the plan to mimic natural science. The root metaphor of the machine is an inept figure to convey the complexity of human interaction and the effects of constantly changing environments. Centuries of experience support the claim that scenes, episodes, acts, and lives can be aptly described without recourse to the transmittal-of-force causality of mechanistic sciences.

Applying the foregoing discussion to the problem of strategic deception, we turn to categories congenial with the contextualist approach to knowing. If we look, e.g., at the work of R. V. Jones,¹⁹ or Anthony Cave Brown²⁰ we

see descriptions of pertinent events in the genre of autobiography and of history. Whether we take small episodes such as the "Crooked Leg"²¹ episode in Jones' book or a larger chunk of history, Operation Bodyguard, the descriptions are more than mere chronologies, and more than causal attributions. To be sure, the authors take temporal reference into account.

The essential feature of their work is the organization of a chaotic mixture of events into a comprehensible plot. That is to say, the writers take "events," "episodes," and "happenings" and string them together, not randomly, and not exclusively on the temporal dimension, but according to a story line. The process of organizing or integrating happenings into a comprehensible story is called *emplotment*.²²

I propose that the planners of strategic interaction, in the course of their work, create a story, the elements of which are the bits and pieces of action, some of which are manipulated and some of which are allowed to happen "naturally." I shall try to show below that the planner, like any teller of tales, does not string happenings together haphazardly, but follows a story line. The use of the epithet "plotter" (often used synonymously with conspirator) is noted here and shows at least a philological connection between the actions of strategy planners and the actions of story tellers and dramatists. Like the author of a novel, the author of a strategy employs a narrative. He fashions a story in which the characters are to play out their roles, influencing each other according to the requirements of the plot. The task for the counter-deception analyst of strategy is like the task of the literary critic or the dramatic critic--to fathom the intentions of the author, to "understand," to decipher the meaning of the creative work. As I noted above, this approach is boldly unconventional to scientists and technologists, but not historians and

biographers. In the following pages, I shall attempt a justification of this approach, at the same time exploring some of the features of emplotment.

THE NARRATIVE AS A METAPHOR

An underlying assumption of my theory is that human beings think, perceive, and imagine according to a narrative structure. That is, given two or three stimulus inputs, the person will connect them to form a story. In penetrating the meaning contained in the writings of historians, White has suggested, as a beginning, a fourfold-classified of emplotment: Comedy, Tragedy, Romance, and Satire.²³ It is not the actions of individual characters but the plot structure that determines whether the reader will be saddened, amused, inspired, or enlightened.

While at first blush the narrative as the root metaphor appears irresponsibly radical, the central idea makes contact with proposals from more conventional sources. The narrative is a way of organizing episodes, actions, and accounts of actions; it is a mode of incorporating not only accounts of actions but also accounts of accounts of actions; it allows for the inclusion of antecedent and concurrent events that guide action. In short, the narrative is an organizing principle and may be compared with organizing principles from more conventional sources. Hammond, for example, employs an undefined "organizing principle" as a central category in social judgment theory,²⁴ Kahneman and Tversky make use of "heuristics" as the equivalent concept in their version of decision-theory. In the constructivist approach to the study of personality, Rosenberg employs an organizing principle: implicit personality theory.²⁵ People convert cues to judgments on the basis of implicit but discoverable theories of

personality. Gestalt psychology has demonstrated that organizing principles are at work in the patterning or structuring of sense data.²⁶ The gestalt idea was incorporated into most theories of perception and is communicated by the aphorism: the whole is greater than the sum of its parts.

Organizing principles are invoked, then, by scientists of many different persuasions to help account for the observation that human beings impose structure on the flow of experience. Note that such organizing principles are most often expressed in abstract or schematic language, such as "heuristics," "integrative hypotheses," "patterning" and so on. The intention in using such language flows from the tradition of mechanistic science. To account for an observed set of regularities, the scientist posits a force, e.g., libido, instinct, drive, habit, reinforcement, and so on. In so doing, the scientist schematizes the flow of experience, seeking structure and organization in abstracted schemata aided by mathematical, geometric, graphic, economic, or other models. A note from John Dewey puts it succinctly:

. . . the novelist and the dramatist are so much more illuminating as well as more interesting commentators on conduct than the schematizing psychologist. The artist makes perceptible individual responses and thus displays a new phase of human nature evoked in new situations. In putting the case visibly and dramatically he reveals vital actualities. The scientific systematizer treats each act as merely another sample of some old principle, or as a mechanical combination of elements drawn from a ready-made inventory.²⁷

The introduction of the narrative as a organizing principle of cognition is both continuous and discontinuous with the efforts of traditional theorists of cognition. It is continuous in that it fills the need for a conception to denote that the flow of experience is organized. It is discontinuous in that it is a departure from the usual notion that is tied to the underlying metaphysic of mechanistic force. It is different also

in that "narrative" has the properties of a lively metaphor. Unlike the abstractions used by cognitive theorists, the narrative calls up images of a story, a plot, characters, and a story teller, and in the narrative that is dramatized, images of actors strutting on the stage.

It remains now to show that the metaphor of the narrative may serve important heuristic functions in the study of cognition generally and in the study of strategic interaction particularly.

In the paragraphs to follow, I want to make a case for the operation of a narratory principle in thinking and acting. The narratory principle may be the overarching conception for the schematized organizing principles such as combination rules, integrating hypotheses, heuristics, and so on, principles that are intended to illuminate how chaotic sense data are organized into structures and patterns. I shall try to show that it is the narratory principle and its derivatives that give warrant to "meanings" as the subject matter for students of the social and behavioral sciences.

To entertain seriously the proposal that the narratory principle guides thought and action, we can look at any slice of life. Our dreams, for example, are experienced as stories, as dramatic encounters, often with mythic overtones. Our fantasies and daydreams fit into the notion of story telling. The ritual of daily life and the pageantry of special occasions are organized as if to tell stories. Our rememberings, our plannings, our learning, even our loving and hating are guided by narrative. The claim that the narratory principle facilitates survival is not to be dismissed as hyperbole. Survival in a world of meanings is problematic without the talent to make up and to interpret stories about interweaving lives.

Story telling is properly associated with fiction, fantasy, and

pretending. Story telling is incorrectly associated with immaturity and playfulness. The basis for regarding an interest in story telling as the expected activity of childhood probably flows from an ideology that places a high value on "realism," on empirical science, on technology, and a low value on imagining and on playful behavior. In America, at least, such a point of view is associated with the Puritan tradition. Both playfulness and feigning were discouraged as improper conduct. One might look into the relics of the Puritan tradition for cues to the apparent lack of interest in grand strategic deception among American military commanders.

Belief in the association of imagining with immaturity has declined in recent times. The ludic behavior described in R. V. Jones' serious book The Wizard War²⁸ makes clear that grown men and women engaged in the most deadly kind of work can insert playfulness into the flow of action.

To the potential criticism that the narratory principle is suspect because it embraces fiction, one must reply with a defense of the imagination. It is true that when we think of stories we think of fiction, fantasy, and pretense. From the standpoint of the tough-minded scientist, fictions must be laid bare in the search for "truth." That "truth" is a conception with unstable footings needs no support in today's ideological climate. The defense of imagination in understanding human thought and action is nowhere better illustrated than in the writing of history. No historical treatise is a mere chronology of events. It is a selection of events which the historian interweaves with interpretation, the latter arising from the quality of his imaginings. The novelist and the historian both write narratives; both are story tellers. The historian, unlike the novelist, is expected to tell his stories so that they are consistent with chronology and reveal a "truth." No less a figure than Bentham sensitized us

to the fact that fictions are a part of the "reality" in which we carry on our business. Even the most positivistic scientists cannot get along without injecting imaginings into their formulations. Every theoretical conception or hypothetical construct is an exercise in imagining, in constructing and using fictions. As I said earlier in connection with the discussion of organizing principles, the traditional scientist ordinarily labels his fictions with opaque and abstract terms, thereby conferring credibility and unwittingly diminishing the probability that the fictions will be seen as such.

The discussion of fact and fiction is not idle. I want to accent that all stories are compounds of "events" and imaginings. Whether novelist, historian, or metallurgist, the person seeks to make sense of his world, and where he has no firm hold on the connection between empirical events, he organizes them into a formulation that meets one or more tests of coherence. I propose that such a formulation, when thoroughly examined, will reveal the narratory principle at work.

Let us take a set of experiments designed to show how people attribute causality through the employment of the narratory principle. Michotte²⁹ constructed an apparatus that allowed an observer to see two or more small colored rectangles in motion. The experimenter could control the speed and direction of the moving figures, and also the distance traveled. Michotte demonstrated that for certain patterns of movement, the observers would attribute causality to the movements of the rectangles. For example, if rectangle A stopped after moving towards B, and if rectangle B then began to move, the observers would say that B got out of the way of A. Michotte used these demonstrations to support the view that causality is immediately given in the organization of the stimulus display. His

interest was in the effects of controlling the stimulus display and not in the language used by the subjects to report the experience of causality. In one set of experiments, A "triggers" an action from B. Michotte writes: "Some very amusing descriptions are given: 'It is as if A's approach frightened B and B ran away,' 'It is as if A in touching B induced an electric current which set B going,' 'The arrival of A by the side of B acts as a sort of signal for B to G,' 'It is as if A touched off a mechanism inside B and thus set it going,' and so on. Also this experiment often produces a comical effect and makes the observers laugh . . ."³⁰

From the description of the experiments it is clear that the meaningless movements of the rectangles were assigned meaning and described in the idiom of the narrative. Each of the illustrative reports is a miniature plot. Could laughter have been a response unless the observer emplotted the actions of the rectangles as narrative figures in a comedy?

Another experiment is even more applicable to the argument that people are ready to describe non-human actions by making up a story. Heider and Simmel³¹ made a short motion picture film of three geometrical figures that moved in various directions and at various speeds. A large triangle, a small triangle and a circle moved in the circumscribed field that also contained a rectangle, a part of which was sometimes open. Observers reported the movements of the geometrical shapes as human action. The three forms in action became characters in dramatic encounters. The reports were not about physical movements of geometric forms, but about people, and the reports made use of sequences in the forms of plots and subplots.

One subject reported (in part): "A man has planned to meet a girl and the girl comes along with another man. The first man tells the second to go; the second tells the first, and he shakes his head. Then the two

men have a fight and the girl starts to go into the room . . . She apparently does not want to be with the first man. The first man follows her into the room after having left the second in a rather weakened condition leaning on the wall outside the room. The girl gets worried and races from one corner to the other in the far part of the room . . . The girl gets out of the room in a sudden dash just as man number two gets the door open. The two chase around the outside of the room together, followed by man number one, but they finally elude him and get away. The first man goes back and tries to open his door, but he is so blinded by rage and frustration that he cannot open it . . ."32

It is interesting to note that some of the observers were given the instruction merely to report what they saw; other observers were instructed to regard the geometric figures as human. The results were similar whether the set for human action was explicitly given or not. It is also of interest that there was considerable agreement on the qualities of the "characters" and on the plots and sub-plots in the created stories.

These experiments call attention to the readiness of human beings to organize and make sense of meaningless movements. No further demonstration is needed that an organizing principle, emplotment, is at work. Emplotment, however, needs further development. One source of support for the narrative principle is in the history and prehistory of humanity. Story telling as a pervasive human activity is supported by the oral tradition, at least as remote as the Homeric epics, by the ancient and still extant practice of guiding moral behavior through the telling of parables and fables, by the use of proverbs (which are shortened fables), by the universality of the story to entertain and to enlighten, and by the omnipresence of special kinds of stories, myths, to illuminate cosmological questions.

I do not want to give the impression that story telling is some postulated "deep structure" within the nervous systems of human beings. Rather, with the development of the skill in using symbols, in talking about absent things as if they were present, (i.e., imagining) story telling has become pervasive, so much so as to be unrecognized by most users of the narratory principle.

In order to distance themselves from the immaturity of children's fables and from the "superstitions" of mythic tales, our forbears employed abstractions to account for action. In psychological science, for example, it is considered anthropomorphic, if not animistic, to embody, or, better, to "emperson" a thing, as in fact, was the case for the observers in the experiments of Michotte and of Heider and Simmel. The more abstract and schematic the term used in theory, the better. Accepting the thesis of the narratory principle would blur the distinction between "reality" and "fantasy," a distinction highly valued in many circles.

When we examine psychological theories, it is no great effort to interpret the abstractions as persons in action. Freud, e.g., was unconcerned with being charged with the misdemeanor of anthropomorphism. He wrote of the struggles, battles, and maneuvers of his abstractions--id, ego, and superego--as if they had become empersoned, had become narrative figures. The vocabulary of psychological science is encumbered with abstractions such as stimulus, response, reinforcement, drives, motives, instincts, cognitions, percepts, and so on. The abstractions are the terms of speculative languages. Only if a reader or hearer is primed with some concrete instance of, say, the abstraction "stimulus," can his interpretation of a speculative story have any meaning. These observations lead me to propose that the theoretical language of psychology and related sciences arises

out of the efforts of scientists to dampen or to repudiate the effects of the universal narratory principle. That is to say, my insistence on emplotment as a device for penetrating meanings is not such a radical departure from scientific practice. Respected theorists also tell stories with their speculations. They are less interesting, however, because they deal with abstractions and it requires sustained effort to retranslate the speculation to its original story form, i.e., to retranslate from the dead abstraction to the live metaphor.

The foregoing pages have been necessary background for the reader interested in a psychological approach to strategic interaction. The discussion flows from my conclusion that the well-entrenched psychology of prediction under uncertainty is not applicable to the unique case, and from the proposal that the concept of emplotment be explored as a means of assessing an adversary's strategic behavior. The use of emplotment is not a substitute for our knowledge about prediction; rather it is a supplementary conception applicable to the unique case. Our interest continues to be the prediction of conduct of other. If we see a fox looking up at grapes beyond his reach, the fable of the fox and the grapes influences our prediction of the fox's subsequent conduct.

The discourse on emplotment is in the service of illuminating the detection of deception and other strategic ploys, such detection providing the basis for predicting the "next moves" of an adversary. Earlier, I discussed prediction from prior probabilities as prediction by sagacity, following the taxonomy suggested by Scheibe.³³ Two other modes are identified by Scheibe: prediction through authority and control, and prediction through acumen. When one party controls another, as in the master-slave relationship, the role structure dictates complete predictability for the

slave. From the slave's point of view, predictability of the master is problematic.

There are many situations in contemporary life where the role relationship makes the behavior of the subordinate predictable. Physicians through implied contractual agreements with their patients can hold an authority relationship to the patient. Under these conditions, the patient is predictable. The role relationship of parent to young child, or monarch to subject, of sergeant to private, is characterized by legitimate authority. Ordinarily, the authority can in principle control the actions of the subordinate, and prediction of the latter by the former is likely to be correct. Perfect predictability is not to be expected, however: the slave may rise against the master, the subject may rebel against the monarch, the child may refuse to acknowledge the authority of the parent, and the patient may seek another doctor. This mode of prediction is not likely to lead to the use of strategic actions on the part of the dominant person in the relationship. However, the subordinate person, in order to achieve his goals and meet his needs, may indeed employ the whole armamentarium of strategic interactions. For example, black slaves in the antebellum South deliberately employed the strategy of "masking," among others, to give the master the impression of a passive, lazy and stupid Sambo.³⁴ Application to international affairs is straightforward. In principle, the powerful state can control the weaker by superior arms, achieving a form of legitimate if coercive authority. No intricate strategies are needed to predict the conduct of the weaker. The weaker state, without the resources or access to power, must be ready to anticipate the actions of the stronger. In order not to lose whatever rights, goods, advantages, etc., permitted by the stronger, the weaker engages in strategic actions: deception,

masking, secrets, and managed communication.

The third mode of prediction is most pertinent to our problem. Prediction by acumen is the stock in trade of persons who can penetrate the masks or expose the lie of the antagonist. He does this not by verbal or nonverbal tips-offs or leakage³⁵ but through empathic skill. "A poker player can know that an opponent is bluffing . . . by realizing that the opponent does not expect to be discovered in the bluff and therefore feels at liberty to bluff." Everyday experience confirms that some people possess skill in "taking the role of the other." The skill in such role taking has been demonstrated in various kinds of simplistic laboratory settings. Although the topic has been studied under the rubric of social sensitivity, empathy, and intuition, only the surface has been penetrated. What appears to be involved when one person consistently makes correct predictions of the conduct of another? Various traits have been posited, such as Einfuhling, social intelligence, empathy, and so. These trait names only serve as synonyms for acumen. Literary sources abound in examples of this quality: Chesterton's gifted sleuth Father Brown and the narrator in Edgar Allan Poe's detective stories made their predictions of the behavior of others through "taking the role of the other." This ability has been the subject of research for several decades, but the attempt to find measurable correlates has achieved only moderate success. Among other things, it seems that the ability to take the perspective of another is related to the person's ability to "decenter," i.e., to shift from an established anchor to a new anchor in perceptual and cognitive judgments.³⁶ However, the size of the correlations are such that one would hesitate to select persons as deception analysts exclusively on the basis of current research.³⁷ From literary and autobiographical sources, one can infer that the person who

is successful in taking the role of another is able to construct a scenario, a story, and place himself in relation to the other features of the story, physical features such as geography and climate, and social features, such as role relationships with multiple role players. (See, for example, Levin³⁸ and Hilgard³⁹).

An important difference between acumen and the other modes of prediction is its contextual nature. While prediction by sagacity and prediction by authority can be achieved through "freezing" or "holding" a matrix of cues and inferences, prediction by acumen involves the person's moving with the experiential flow, and responding flexibly to change and novelty as the target person enacts his roles. We shall return to the topic of acumen in connection with proposals for improving the skill of analysts of strategic interaction, including deception.

THE ARMAMENTARIUM OF STRATEGIC INTERACTION

Scheibe⁴⁰ has identified four tools to aid in the major objectives of strategy: security and cover of one's own plans and actions, and detection of the adversary's plans and actions. He refers to these tools as mirrors, masks, lies, and secrets. Although Scheibe's intent was to illuminate the strategies of interpersonal action, his descriptions of the tools of the strategist are germane to the analysis of military and political deception. The tools are useful for any of the modes of prediction, but they are especially pertinent for acumen.

The mirror is a metaphor for reflected information, sometimes called feedback. A person, a team, or a large organization, to know its capabilities, may emit certain responses in order to examine what is reflected. A strategically placed mirror will help the actor guide his performance so

as to avoid mistakes. In managing communications, a deception specialist can send out ultimately verifiable information to determine whether his communications are perceived as credible. A well known example is the controlled German spy in WWII who reported to the Abwehr that Eisenhower had set up headquarters in London. The information was not public knowledge until a week later. The Abwehr command served as a mirror, giving increased credibility to communications from this agent. In using the mirror as a tool of strategy, the actor, team, or political unit asks the question: How do I look to others? Or, alternately, how do others perceive me? In the illustration above, the "control" for the spy would assess his status as "credible."

No less than for other tools, mirrors do not have perfect validity. Mirrors, both literal and figurative, can reflect actual states of affairs and also illusory conditions. To continue the metaphor, mirrors may be distorted and give unreliable reflections. The strategist will therefore try to use multiple mirrors with different reflecting (information giving) properties the better to construct a coherent theory of the adversary's intentions.

A second tool is the mask. In personal or military strategy, its purpose is to conceal plans and intentions and also to guide the adversary's perceptions. Masks can be used as defenses, giving information to the adversary that would indicate that one is stronger, more mobile, better equipped, etc., to deal with any contingency. The mask is the tool of espionage--the spy presents himself as one identity through appropriate masking when, beneath the mask lurks another identity. Disguise serves the masking function. The notional First United States Army Group (FUSAG) that was stationed in East Anglia with rubber tanks, plywood dummy aircraft,

and other imaginary features is a thoroughly discussed example of the use of masks. The failure to penetrate the mask of strength in East Anglia contributed to Hitler's unsuccessful defense plans.

It is in connection with masking that the theatrical metaphor is most productive. The lessons of the theater are not learned overnight. The deception planner must be alert to all the varieties of stagecraft in order to present a credible mask. A secret memo (now declassified) dated 11 July 1944 is instructive.⁴¹ Clearly, the message has to do with maintaining the credibility of FUSAG, the notional military force. "The attitude of the 23d Hqs towards their mission is lopsided. There is too much MILITARY . . . and not enough SHOWMANSHIP. The 603d Engr, on the other hand, contains too much ARTISTRY and not enough G.I. TACTICS. The successful practice of military deception by the 23d Hqs requires the proper amount of SHOWMANSHIP and ARMY PROCEDURES.

"Like it or not, the 23d Hw must consider itself a travelling show ready at a moment's notice to present:

THE SECOND ARMORED DIVISION-By Brooks

THE NINTH INFANTRY DIVISION-By Eddy

THE SEVENTH CORPS-By Collins

The presentations must be done with the greatest accuracy and attention to detail. They will include the proper scenery, props, costumes, principals, extras, dialogue and sound effects. We must remember that we are playing to a very critical and attentive Radio, Ground, and Aerial audience. They must all be convinced."

The report continues with a number of specific stage directions one of which is especially interesting." "Get the installation in, then lie down and take it easy. All you got to do is blow up (inflate) the (dummy)

tanks and then you can go to sleep,' said one Colonel to a group of 603d Camoufleurs. This is very bad 'theater.' The Colonel forgot that we were in the show business and thought he was actually dealing with real tanks and tankers. In reality only part of the job is done when the dummy tanks are in position. They merely represent the 'scenery'--the PLAY must go on until the 23d is released to return to its base camp. They must repair 'Tanks,' hang out washing, go looking for cider, and generally mill around in typical GI style."

The problems of the deception analyst are the obverse of the problems of the "stage manager" who employs the strategy of masking. The more convincing the staged performance the more acute must be the efforts at detection.

Lies are intentional communicative acts that misrepresent "facts." The distinction between a lie and fiction is important to make. A lie is a fictional statement or action that is represented as truth; a fiction is represented as a fiction. Most of the work on deception has to do with the telling of lies. Masking and lying overlap. For example, after the Normandy invasion, Churchill and other leaders intimated that there would be additional landings, communicating that the Normandy action was but one of a series of planned military actions. The intent was to deceive the enemy, but the communications were stated in oblique ways, encouraging ambiguity. To detect lies, the strategy analyst faces the same problem as any person who must make an assessment of another's expressive behavior: The ultimate test is the comparison of the suspected deceptive communication with validating criteria, contrary or supporting evidence, and so on.

The fourth tool of strategic interaction is secrecy. In strategic interaction, secrets perform a special function. They conceal plans without the risk of using a distorted mirror, an ineffective mask, or a bald-faced

lie. If the adversary is misled it is not because he has been exposed to strategic information. The use of secrets in creating ambiguity is indicated by Scheibe: ". . .there is another use of secrets for purposes of gathering intelligence--as capital for exchange. One effective way of gaining access to gossip is to offer a bit of gossip in exchange. Since secrets can be so easily manufactured (as lies) it is a simple matter to make up secrets as they are needed to prime the pump for the exchange of rumors. This is a major mechanism for the magnification of scandal.⁴²

The tools of strategic interaction--mirrors, masks lies, and secrets--are available to everyone. For this reason any advantage gained through prediction by one party in an adversarial situation can be nullified by the other. In the case of prediction by sagacity (the use of base rates), one party can nullify the predictions of the other by misrepresenting himself. In the syllogism, All M are P, Jones may be an X but represent himself as a M. If his misrepresentation is successful, he will be instantiated as a P.

The nullification of prediction via authority and control is brought about by the subordinate not "playing the game," by dissent, by contract breaking, by rebellion, and by masking and lying. The assumption that the person or group that controls a relationship has unilateral access to the tools of strategic management cannot be maintained. All persons or groups have access to the tools of information management. Whether they use such tools is a function of considerations of risk, expediency, and so on.

Prediction via acumen can also be nullified. If both parties have access to the same base rates (if they are equally sagacious) and if they have no authority or control over one another, then the potential winner in an adversarial situation will be the party with superior acumen. However,

both parties can, in principle, "dope out" each other's next movements.

In such a case, the advantage will move back and forth as each makes accurate predictions of the other's moves.

We have come full circle and again confront the question: under conditions of uncertainty where stakes are high, where some predictions are nullified by the operation of error-producing heuristics and biases, and where other predictions are nullified by the adversary's use of the tools of strategic interaction, can there be a science of information management? Can we select and improve the ability of our counter deception analysts to predict by taking the role of the other? Is it possible to gain a permanent advantage through increased acumen? These and other questions are addressed herewith in the final section of this essay.

THE CONDITIONS FOR SUCCESSFUL STRATEGIC INTERACTION

From the foregoing account, it is transparent that I am not sanguine about the development of a scientific or mathematical model for the study of strategic interaction. My analysis directs me to seek answers to the persisting questions by appealing to the humanistic tradition. Earlier, I speculated on how the narrative could serve as a metaphor to guide our research. The underlying postulate is that the deception planner has as cognitive background a life lived according to narrative. He constructs a story in imagination. Lyman and Scott⁴³ refer to this construction as the pretext to differentiate the imaginative planning from the actual carrying out of the plan, i.e., the text. Given that the texts are influenced by many contingencies, can the pretexts be subjected to scrutiny?

A basic question needs to be answered: do individuals with common ethnic origins and national heritages develop certain kinds of plots and

not others? If the Russians were plotting a strategic interaction, would the plot follow from the tragic mode so often associated with both the Russian novel and the Russian landscape? Would the Americans construct plots out of the raw material of romance, conditioned by an abundance of Hollywood movies and television dramas? Would the pretexts, the imaginative planning, reflect the Puritan tradition that proscribes deception and feigning? Or would the pretext be influenced by generals following the romantic tradition of the Old South with its emphasis on honor, gallantry, and manners? These questions appear unanswerable. Yet literary historians are able, from hindsight, to identify the forms of emplotment used in a particular account.⁴⁴ To be sure, hindsight facilitates such historical analysis because the outcome as well as the antecedent conditions are known. The problem for the counter deception analyst is to construct a plot from antecedent events and predict the outcome. We are still concerned with prediction, but the foundations for the prediction are not specific events, but the organizing principle that assigns meaning to the happenings. The plot, once it is constructed, will dictate the possible endings for the incomplete story.

It appears that the whole Bodyguard program⁴⁵ (Cave Brown, 1975) could be seen as emplotted in satire. The accounts of British intelligence as presented by Cave Brown and Jones⁴⁶ lead to the inference that such units as the London Controlling Section, (the small group charged with formulating plans for strategic deception in WWII), MI-5, and MI-6 engaged in their work much in the manner of college students perpetrating a hoax. In fact, Jones regards the hoax as a fitting model for strategic deception. Cave Brown is clear in his judgment that the British deception strategists wanted not only a victory but also wanted to leave the enemy perplexed,

confused and dumbfounded. The reactions of the British participants to reports of successful deception were hardly the reactions of serious minded adults engaged in a terrible conflict, rather they seemed to enjoy the job of creating a gigantic hoax. The form of emplotment that corresponds to the hoax is satire, the prevailing trope is that of irony. Jones has important words to say about both.⁴⁷

Writing of the inductive building up of the hoax, Jones says: ". . . the object is to build up in the victim's mind a false world picture which is temporarily consistent by any test that he can apply to it, so that he ultimately takes action on it with confidence. The falseness of the picture is then starkly revealed by the incongruity which his action precipitates."⁴⁸ In another place, he recognizes the need for "taking the role of the other" and provides tangentially some support for the narratory principle. "As with all hoaxes, the first thing is to put oneself in the victim's place (indeed a good hoax requires a sympathetic nature) to see what evidence he has with which to construct and test his world picture."⁴⁹

Putting oneself in the victim's place, means of course, putting oneself in the victim's place in the context of the developing world view. Taking the victim's role implies that the role belongs to an ongoing drama, a story, the victim being but one actor in an emplotted story.

General William H. Baumer, an American Army officer detailed to the London Controlling Section, spoke of different attitudes of American and British commanders to strategic deception. In his view, the typical American military commander was not very different from the John Wayne stereotype: "Throw everything at 'em" rather than embark on the uncertain outcomes of deception. By contrast, the planners of the British strategies were men and women, most of whom had had classical English educations, and felt at

home in the world of imagination and literature. The American bias might have been a reflection of the belief in the American superiority in fire-power, troops, and material. Deception, then, would be an unnecessary and perhaps delaying element.⁵⁰

In this connection, it is possible that the preference for strategic interactions might be related to the long tradition of literature and drama in England. Such traditions have a way of influencing educated men and women to think and act with the words and deeds of historical and literary figures. To perpetrate a hoax of such large proportions, then, may require skill in imagining, in contemplating the counterfactual, in addition to the skill in taking the role of the other, as Jones suggests. The skill in imagining may indeed be related to the acquisition of many narratives, narratives that can serve as hypotheses for the deception planner.

This essay may be regarded as a prolegomenon to a more extensive study of its central thesis: that the narratory principle guides human actions, including the planning of strategic interaction. To predict the unique case, the known actions of a target person or organization serve as the framework upon which a plot is constructed. The hypothesis that needs to be tested is: the form of the narrative is recognizable by sensitive communication analysts.

Can acumen be taught and learned? The literature of psychology contains a number of programs that in principle might serve as heuristic devices for the training of analysts of strategic interaction. If there is merit to the proposal that detection occurs as the result of acumen, and acumen follows from locating the noticed events in a plot, it would be helpful to the detective to recognize optimal strategies for examining events. When is an "event" an event? The world is in constant flux.

Like the historian, the observer in the counter deception business must create boundaries for events.

In recent years, Newtson⁵¹ and Allen and Atkinson⁵² have provided some interesting leads to help identify the process that defines "events."

Laboratory experiments have been directed toward discovering the correlates of various strategies of "unitizing" behavior. To a degree, persons can be instructed to adopt a global or a fine-grained strategy for segmenting the behavioral flow. Suppose the observation of interest is a suspected spy waving farewell to a woman who has just entered a taxi. The global unit observer would organize the behavior at a fairly gross level; many components would be combined into a single unit. The observer would, e.g., note that the man waved his hat, at the same time saying "goodbye," and the woman acknowledged with a smile and a wave of her gloved hand as the taxi left the curb. Both actors' behavior appears to flow smoothly and without apparent deliberation. The fine-unit observer would concentrate on the detailed components. The man removed his hat with his right hand. He raised the hat about six inches. He leaned forward. His lips moved as if he were saying "goodbye." He stepped back and straightened his posture as he placed his hat on his head, tugging the brim. The woman entered the cab and sat in the middle of the seat. She crossed her legs, modestly pulled her skirt over her knees, placed her purse on her lap. Her left hand steadied the purse, then she bent her right arm at the elbow. She smiled a quick, nervous smile and waved her right hand in an arc of about 10 degrees. As the taxi pulled from the curb, she turned her head to keep her gaze fixed on the man.

Such close examination at first appears strange to an observer. Rather than seeing a meaningful episode, he sees a multitude of miniature actions,

to each of which he may assign an implicature. Under such an information search strategy, the conduct appears deliberate, as if there were intentions concealed by the sequence of overt behaviors. Such a direction would lead to the creation of a plot structure around deception as a motif.

Newton⁵³ and Allen and Atkinson⁵⁴ have demonstrated, among other things, that under no instructional set, people tend to have a preference for a particular strategy of segmenting or "unitizing" the behavior stream.

The evidence points to an additional observation that is potentially useful to the analysis of deception and the practice of counter deception. When an unexpected action occurs, the observer will shift from whatever unitizing strategy he is employing to one that is more fine-grained.

To use a more fine-grained segmenting procedure has an important implication: the observer will read into the behavior the interpretation that the actor(s) are being deliberate, rather than spontaneous; the instantiation "being deliberate" rather than "spontaneous" is more likely to be followed by the attribution of deception to the observed sequence.

I cite the work on segmenting as one approach that would lend itself to further study. It is consistent with the narratory principle, it is amenable to experimental manipulation, and so on.

Other contemporary findings could be incorporated into an overall theory of strategic interaction and communication management, among them the extensive work of decision making in groups.⁵⁵ Since the usual scenario of deception planners of counter deception analysts shows a half dozen or more specialists sharing information and designing plots, it would be important to show how each person's story influences the others; how military rank influences which story is given preference; how rank influences the weight to attach to information given by low-ranking or

high-ranking officers, etc.

CONCLUDING REMARKS

It is not likely that strategists and analysts of strategy will surrender their decision-making tasks to the "rational" use of prior probabilities. Nor should they. The potential outcomes of their decisions are often of such magnitude that each case must be regarded as unique. Prior probabilities and the employment of models based on mechanistic causality are of little value in predicting for the unique case. This conclusion is not new for practitioners of strategy nor for the practitioners of counter deception. However, it needs to be re-affirmed in order to maintain an appropriate degree of skepticism about the potential contribution of hypothesis-testing methods to the solution of problems arising from the analysis of strategy.

This conclusion is familiar to scholars and practitioners whose roots are in the humanities and in the arts of practical affairs. Although they may not describe their work in the language used in this paper, it is clear that they work from a set of assumptions other than those of scientists whose research depends on replication of events and on the long-submerged premise of the continuity of nature.

The premises most useful in the analysis of strategic interaction have their home in the contextualist assumptions of the root-metaphor of the historic event.⁵⁶ Rather than construing the world from the premise of the continuity of nature, the contextualist assumes novelty and change. In predicting the actions of an adversary, then, the analyst of strategy will employ coherence as a criterion to assess the credibility of an analysis.

Given the context, do the observations hang together? Such a question must be resolved by imaginatively constructing a plot, then testing the implications of the plot against observations.

I have proposed in the previous pages that the analysis of strategy is an exemplar of a broader category; the analysis of emplotment. Emplotment is a literary category that has the warrant of history. It is to the detailed study of emplotment that we must next turn in order to further penetrate the problems of strategic analysis and counter deception planning. Unlike the historian who emplots a narrative about events that have occurred in the past, the analyst of strategy must emplot concurrent events, events that are not frozen but fluid. To predict behavior under such conditions requires acumen, a special skill on the part of the analyst.

The successful penetration of the strategic plans of an adversary, then, is dependent on identifying analysts who can be characterized as skillful in emploting the actions of others. A practical recommendation arising from my conclusions is that efforts should be directed to identifying counter deception personnel who demonstrate acumen in emploting the strategies used by others. Research methods have already been developed for the study of acumen as a tool of interpersonal perception.⁵⁷ The next step is to adapt these methods to the study of strategic interaction.

FOOTNOTES

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¹⁹ Reginald V. Jones, The Wizard War: British Scientific Intelligence, 1939-1945 (New York: Coward, McCann and Geoghegan, Inc., 1978).

²⁰ Anthony Cave Brown, Bodyguard of Lies (New York: Harper & Row, 1975).

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²⁷ John Dewey, Human Nature and Conduct (New York: Henry Holt and Co., 1922), pp. 145-146.

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ASSESSING THE VALUE OF AN
ORGANIZATIONAL APPROACH TO STRATEGIC DECEPTION

Ronald G. Sherwin

INTRODUCTION

The term, "strategic deception," refers to instances during war or intense international competition where countries attempt to mask their diplomatic and military strategy either by confusing or by misleading their opponents. The deceiver's overriding objective is to gain a strategic advantage by encouraging an opponent to respond inappropriately to the real state of affairs. Recent books and articles have sparked an interest in this subject from both an operational and theoretical viewpoint. They include a number of intriguing titles: Bodyguard of Lies;¹ Ultra Goes to War;² The Wizard War;³ Pearl Harbor: Warning and Decision;⁴ and the "Rational Timing of Surprise."⁵

Focusing on the strategic aspects of deception represents a conceptual reorientation to the phenomenon inasmuch as the study of "deception" historically seems to have been confined to tactical situations. In this sense, concern for deception seems to have been confined to individual engagements or battles and campaigns, while the business of large scale, strategic deception has received little attention. However, after being embroiled totally in war and forced to stretch every available resource to its limits, countries - notably Great Britain during World War II - have employed deception not just at the tactical level of conflict, but also at the highest levels of political and military interaction. This escalation in the use of deception involves nations' highest decision makers using diplomacy, economics, espionage, intelli-

gence, and virtually every conceivable dimension of modern international conflict in order to mislead or confuse opponents. Thus, the principal trait distinguishing strategic deception from tactical deception is that it takes place at a higher level of international interaction and involves a wider range of variables.

The emergence of strategic deception as an adjunct to the conduct of international affairs raises many important theoretical and operational questions. The theoretical questions concern whether strategic deception is sufficiently tangible to support a collection of empirically verified propositions about its nature. At the same time, the operational questions concern whether principles of strategic deception can be employed reliably to evoke predictable perceptions and behaviors from an opponent, and to detect as well as counter an opponent's own deception schemes. In short, these questions concern whether or not strategic deception can be studied systematically and whether knowledge about its properties can be applied in the policy arena.

Asking these questions raises an important issue concerning strategic deception. While feints and false information ordinarily accompany competitive strategies at all levels of behavior from parlor games to commerce, and while there are theoretical analogues which may be useful for studying deception at the strategic level, it is important to underscore several facts. First, strategic deception takes place at the highest levels of interaction, i.e., international relations, and it involves the highest stakes. Further, it is important to note that strategic deceptions are not known to occur frequently and that the details of how they are perpetrated are closely guarded secrets. These facts create

a difficult situation for research and theory-building inasmuch as there are few empirical cases from which to draw generalizations and data, and the data which are available may be filtered to protect national security interests.

The small number of cases of strategic deception and the secrecy that surrounds them render the phenomenon relatively inaccessible to researchers. This situation is not unique. In the past, researchers have been faced with trying to analyze such inaccessible phenomena as international crises, arms races and deterrence confrontations. In order to study these phenomena, researchers draw freely from their own experience and insight as well as from principles derived from other disciplines such as psychology, sociology, and economics which study more accessible phenomena. In most respects, this has been a fruitful research tactic since reliable, operationally useful indicators and theoretical principles have evolved by which decision makers may exercise partial control over certain international relations processes. Realizing that reliable theories have been developed from studying seemingly inaccessible international relations phenomena in the past leads to the questions of whether similar results might stem from studying strategic deception.

Naturally, this question cannot be answered concretely without devoting time and energy to the concept of strategic deception and without employing a simplified, logical approach to the problem. One approach is to divide the concept of strategic deception into intellectually manageable components, and, where possible, apply principles from other disciplines in hopes of gaining theoretical leverage on the concept. Towards this end, this paper applies an organization approach to the con-

cept of strategic deception and employs the notion that large organizations are involved as targets of deception. These organizations can be viewed as intelligence organizations whose function is, first, to attend to, as well as to interpret, matters in the international environment which pertain to a nation's security, and, second, to pass information and interpretations along to national decision makers.

Consistent with its focus on intelligence organizations, this paper draws principles from several research perspectives which are relevant to the study of organizations. The first perspective focuses on organizational structures and on simple interaction networks. The second focuses on the application of communications theory to organizational structures. A third, information processing perspective, focuses on the factors which affect the admission of information into a communications network as well as on the meaning attached to information as it is processed. A fourth perspective, which might be termed a "situational context" perspective is also examined. This perspective focuses on exogenous factors which affect how organizations process information.

As a group, the four perspectives simply are different views of the same phenomenon; i.e., the intelligence organization as it attends to, processes and transmits information to decision makers who are the ultimate targets of strategic deception. In a sense, then, this paper is a hologram in which it is apparent that the same object remains in view, even though the viewing perspective changes. From each perspective, this paper attempts to identify what specific variables might contribute to understanding the role that intelligence organizations play in strategic deception and it attempts to assess each perspective's

theoretical and operational usefulness.

There is a section in this paper devoted to each of the four perspectives. In addition, there is an initial section which emphasizes the importance of organizations in strategic deception. And finally, there is a conclusion which assesses the prospects for applying an organizational approach to the study of strategic deception.

INFORMATION PROCESSING AND INTELLIGENCE

An organizational approach to strategic deception requires a concept of organizations and their role in deception. In one sense, organizations may be viewed as perpetrators of deception which implement the policies of national leaders. This view of organizations focuses attention on the principles which govern the way organizations are structured in order to carry out policy. While this is an important field of inquiry, it is not the central focus here. Instead, the prevailing view taken here is that organizations serve an information processing role for national decision makers. This view fits a cybernetics model of decision-making.

A simple cybernetics model of foreign policy decision-making has been outlined by Karl W. Deutsch in The Nerves of Government.⁶ Deutsch's conceptualization is consistent with other, more elegant statements of the general cybernetics paradigm,⁷ and it emphasizes that the foreign policy decision-making process requires that sensors be emplaced in order to interpret and transmit information about vital international circumstances to decision makers.

The sensor idea contains the notion that national governments establish institutions and organizations which are responsible for attending

to and monitoring environmental conditions, changes in which may affect the overall well-being of a nation and its ability to achieve its goals. Such organizations need not always operate covertly, for there is much to know about the environment which is public. Further, sensor organizations do not monitor everything that goes on in the environment. Instead, they attend to a few things more carefully than to others, and they literally ignore most things. They make assessments regarding those things to which they attend, and pass their assessments along to decision makers. In the study of international relations the procedure by which nations publicly and covertly attend to external phenomena and by which decision makers receive distilled information is called the intelligence function, and this function is performed, in part, by "intelligence organizations."

According to the cybernetics paradigm, an important factor affecting decisions is the information which policy makers receive from their intelligence organizations. This seems obvious. It also seems obvious that additional factors converge on the decision arena. These additional factors include the size of the decision-making group, their particular mind set, their perceived goals, their responsiveness to demands for allocating resources, and so forth. Consequently, the role of intelligence organizations is attenuated by other factors, and determining how important the intelligence organization is in shaping policy is difficult.

Even so, intelligence is central for rational decision-making, and the intelligence gathering process alerts decision makers of developments in the environment which require policy action. It follows that the factors which affect the information's configuration, flow, and

meaning are important. Those factors dictate what will be attended to, what will be interpreted, and what will be transmitted to decision makers.

It is possible that insights and data regarding the factors which affect the intelligence function may be garnered from examining intelligence organizations in terms of the four perspectives discussed here. These perspectives may enhance understanding of strategic deception in two ways. First, much of what decision makers know about the things with which they are trying to cope comes to them through the intelligence process, so that understanding what affects that process helps to explicate foreign policy decision-making in general. Second - and more to the point - once the factors which affect the intelligence function's relation to decision-making are understood, it may be possible to manipulate those factors in order to prevent, or perpetrate a deception.

INTERACTION STRUCTURES

The most fundamental way to analyze groups and organizations is to focus on interaction structures, because it is over an interaction structure that information passes. The structural mode of analysis stems from the notion that, over time, groups and organizations establish interaction patterns which stabilize and which can be mapped to reflect who interacts with whom.⁸ In addition to simple mapping, this analytic technique can be used to describe who engages in what kinds of behavior with whom and over what issues.

For the most part, people sense the practical importance of knowing who interacts with whom, just as they sense that information flows and interaction structures parallel each other. They also sense the importance

of patterning interaction structures in a manner which allows a group or an organization to fulfil its role as efficiently as possible. In large organizations this insight manifests itself in the ubiquitous organizational chart and in endless organizational restructuring. Perhaps because the notion of interaction structure is relatively concrete, and perhaps because of the ease with which data can be generated in controlled experiments for testing hypotheses concerning group structures, a set of techniques have been developed which can precisely map interaction structures.

The basic tool used in mapping is the "adjacency matrix." An adjacency matrix contains in mathematical form the information which often is depicted in a "sociogram," or "directed graph."⁹ Once a group's interaction structure has been depicted on a matrix, it is possible to discover certain attributes of the structure by manipulating the matrix. This is accomplished principally by performing a collection of set theory-based operations. The matrix operations permit tracing series of complex interaction linkages in order to determine, say, whether and to what extent a large organization is structured hierarchically, or to identify communication bottlenecks.

Adjacency matrices are particularly useful in mapping large systems where interaction patterns and communications linkages are difficult to trace beyond one or two steps. In order to illustrate this fact, the following directed graphs, depicting possible interaction structures that might emerge in a five person group, are analyzed in terms of their "relative centrality" using matrix-- or "graph theoretical"--techniques. From the two graphs, it is clear that one group is hierarchical, or cen-

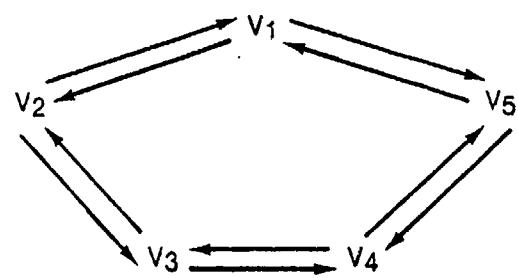


Figure 1

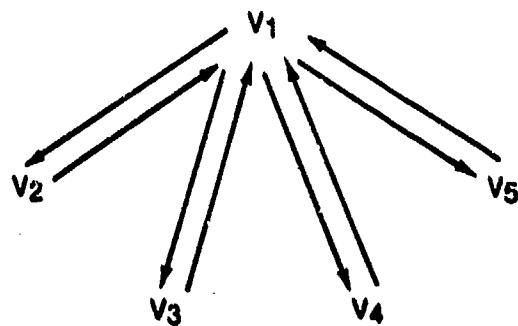


Figure 2

tralized, while the other is non-hierarchical.

Alex Bavelas has found that a task-oriented group displaying a centralized interaction/communication structure will tend to choose the more central person as its leader.¹⁰ Bavelas called the critical variable a person's "centrality." He found further that the most central person was the most likely to have an impact on the procedures employed by the group to perform its task, and that the most central person was most likely to transmit information about the group's activities to others. This research result is suggestive for an organizational approach to deception, where determining the centrality of a person or subgroup may affect the manner in which an intelligence unit performs its work and transmits its findings.

The differences among the centrality of the points in Figures 1 and 2 are obvious from visual inspection: in Figure 1 each point is equally central, and in Figure 2 point V_1 is more central than the others. The relative centrality of the points in the figures can be expressed as

$$\text{Centrality} = \frac{A_i}{\sum D_{ij}} \quad \text{Equation 1}$$

where;

$\sum D_{ij}$ is the sum of the lengths of all the distances in the group's structure, and

A_i is the sum of the distances in row i of a "distance matrix."

By manipulating the adjacency matrices in $A_{\text{fig.1}}$ and $A_{\text{fig.2}}$, it can be determined that the centrality value for each of the points in Figure 1 equals 5, while in Figure 2 the centrality value for point V_1 is 8 and the value for the remaining points is 4.6.¹¹ The derivation of these

	1	2	3	4	5
1	-	1	0	0	1
2	1	-	1	0	0
3	0	1	-	1	-
4	0	0	1	-	0
5	1	0	0	1	-

$A_{\text{fig.1}}$

	1	2	3	4	5
1	-	1	1	1	1
2	1	-	0	0	0
3	1	0	-	0	0
4	1	0	0	-	0
5	1	0	0	0	-

$A_{\text{fig.2}}$

	1	2	3	4	5	A_1
1	-	1	2	2	1	6
2	1	-	-	2	2	6
3	2	1	-	1	2	6
4	2	2	1	-	1	6
5	1	2	2	1	-	6

$N(D)_{\text{fig.1}}^2$

$$\sum D_{ij} = 30$$

$$N(D)_{\text{fig.1}}^n = A_{\text{fig.1}}^n \theta > 0$$

Equation 2

	1	2	3	4	5	A_1
1	-	1	1	1	1	4
2	1	-	2	2	2	7
3	1	2	-	2	2	7
4	1	2	2	-	2	7
5	1	2	2	2	-	7

$N(D)_{\text{fig.2}}^2$

$$\sum D_{ij} = 32$$

$$N(D)_{\text{fig.2}}^n = A_{\text{fig.2}}^n \theta > 0$$

Equation 3

values becomes clear from studying the two "distance" matrices $N(D)$ ² fig.1 and $N(D)$ ² fig.2. Each matrix corresponds to the distance structures of Figures 1 and 2, and reveals the maximum distance from each point in the group to every other point. The distance matrices were derived from the adjacency matrices A fig.1 and A fig.2, which, according to convention, are square matrices containing an entry if the entity depicted as row *i* can reach (or direct an action towards) the entity depicted as column *j*.

Graph theory's importance in studying organizational communication has been shown by those who have demonstrated that group structures and communication patterns play a large role in determining how a group performs its task and interacts with other groups.¹² Consequently, the structural approach promises to shed light on the role of intelligence organizations in deception. However, a closer examination of the approach and the way it has evolved among social science researchers suggests that the approach may be too sharp an instrument either for studying the small number of historical cases of strategic deception for which data exist or, particularly, for implementing deception. In her landmark analysis of the United States' failure to perceive correctly the facts which would have forewarned of the Japanese attack on Pearl Harbor, Wohlstetter documents how the structure of the information channels within the United States intelligence and command community affected the transmittal of information.¹³ Perhaps, if Wohlstetter had conducted something other than an historical analysis on a more contemporary case of deception for which she could have gathered more detailed data, she may have been inclined to perform the more precise kinds of analyses which graph theory entails. However, regardless of whether this would

be the case, it needs to be asked whether Wohlstetter's analysis, or any analysis which deals--of only tangentially--with organization structures would gain sufficient increases in theoretical leverage on strategic deception from employing graph theory techniques to justify the effort. Especially if the analysis is limited to one or just a small number of cases for which only historical data are available. Graph theory techniques may be too refined for the quality of the data which currently exist regarding deception. It seems that for the time being, insights about organization structures and their precise role in the small number of known strategic deceptions will not be generated by graph theory techniques themselves, although intuitive analysis of organizational structures may still prove fruitful.

This conclusion seems especially relevant for developing operationally useful concepts for perpetrating strategic deception. It seems reasonable to argue that in order to carry out a successful deception, policy makers must attend to the communications structure of the target organization in order to insure that deceivers send information to points in an organization which have connections to decision makers. At the same time, however, it is unreasonable to expect that a deceiver can learn as much detail about a target organization as graph theory requires in order to be useful. On balance, it seems reasonable to conclude that structural variables have an impact on deceptions and that both analysts and perpetrators must somehow take structural variables into account. But it also seems that the analytic precision implied by graph theory is neither attainable nor required in order to successfully perpetrate a deception.

In further assessing graph theory's promise for shedding light on

the role of intelligence organizations in strategic deception, it needs to be recognized that the approach has several methodological and theoretical shortcomings. These shortcomings are related to the fact that structural maps primarily are static and descriptive.

At the beginning of this section it was noted that groups and organizations establish stable interaction patterns over time. Consequently a technique designed to reflect stability over the long run is not likely to reveal variation in the short run. While a structural model will depict who might interact with whom, such a model would not reveal when someone actually did interact with someone else. Knowing how likely someone is to communicate with someone else based on past probabilities may be useful for analyzing deception in a general theoretical context when data are available from many cases. However, when analyzing discrete historical cases or when perpetrating individual deceptions, it seems essential to know for certain whether someone actually did communicate with someone else. This type of knowledge cannot be generated from the structural perspective.

Not only do graph theoretical techniques fail to reveal short term variations, but the major graph theory techniques are boolean or binary, so, for the most part, they preclude using measures which reveal the degree to which variation in one phenomenon can be linked to variation in another phenomenon. That is, the techniques are descriptive and atheoretical. They give no insight into how interaction patterns arose, how they are changing, or if they will change.

Attempting to account for why a particular pattern arises leads to questions concerning why intelligence organizations attend to certain

types of information and not to others, and why they process what they attend to in one way and not in another. As suggested earlier, answering these questions is important in analyzing the role of organizations in strategic deception. So, while the structural perspective may be useful for identifying key channels in a communications network or for predicting the route that information will take on its way to a decision maker, the perspective leaves important questions unanswered regarding other important aspects of the organizational approach to deception.

COMMUNICATIONS THEORY

A second perspective that compensates for some of the shortcomings of the structural approach is the communications perspective. The communications perspective reflects the principles of communications theory which are discussed elsewhere in this report. The communications perspective, as applied to behavior within an organization rather than to linkages between organizations, has some characteristics which advance an organizational approach to strategic deception.

To someone familiar with both communications theory and graph theory, it is clear that the two approaches complement each other. Graph theory identifies and maps interaction/communication channels, while communications theory measures what passes over those channels. From the latter perspective, an interaction link becomes a communications channel, and interacting entities alternate between being information senders and receivers.

The structural and communications perspectives complement each

other further inasmuch as each is based principally on its own unique measurement concept. Whereas the adjacency concept is the fundamental measure for analyzing interaction structures, "variety" is the fundamental concept for analyzing communications networks.¹⁴ Basically, the variety measure, H-rel, is the ratio between the variety of messages, U, actually transmitted through a channel and the maximum variety, U_{max} , of messages that could be transmitted through that channel. The measure is defined as follows.

$$H-rel = \frac{U}{U_{max}} \quad \text{Equation 4}$$

where;

$$U = -\sum p \log_2 p \text{ when } p(1), \dots, p(n) \text{ are empirical or theoretical probabilities, and} \quad \text{Equation 5}$$

$$U_{max} = \sum p \log_2 p \text{ when } p(1) = p(2) = \dots = p(n) \quad \text{Equation 6}$$

When transmissions are redundant, i.e., the variety of messages is low and, therefore, relatively certain based on a record of empirical probabilities, H-rel will be low. In the opposite sense, when transmissions are uncertain, i.e., when events appear randomly without constraint, H-rel will be high.

This metric has at least two interesting properties. First, it transforms the distribution of events in a set of nominal categories into an interval/ratio scale that supports measures of association. Indeed, one author has attempted to develop measures of statistical association which hinge solely on H-rel.¹⁵ Secondly, H-rel is useful for gauging the reliability of information channels: when the H-rel values of information leaving a channel equal the values for information enter-

ing a channel, the channel can be considered to be a reliable transmitter of information. That is, additional information, or "noise," does not enter the message (increased H-rel) or information is not lost in the channel (decreased H-rel).

As a consequence of these properties, the basic communications measure promises to reveal several things that seem to be important to know about intelligence organizations and their role in deception. By using the variety measure, it seems possible to determine whether particular nodes in the communications structure transmit information exactly as they receive it, or whether they transform it in some way. Similarly, it is possible to gauge the speed with which information is transmitted through a network, and it is possible to gauge the ultimate capacity of a network or its individual channels to transmit large quantities of information.

While the information measure seems useful for studying the internal transmission of messages by an intelligence organization, the concept seems more directly applicable to studying an intelligence organization's responsiveness or receptivity to changes in external signals. Milton Rokeach makes a dichotomy which clarifies this point when he contrasts open and closed minds.¹⁶ He characterizes closed minds as being dogmatic in the sense that they are unresponsive to external changes, and he maintains that closed minds tend to ignore changes in the environment or to reinterpret external changes in order to preserve the internal stability of previous patterns of processing information. In contrast, Rokeach characterizes open minds as being responsive to external changes, and he maintains that open minds tend to allow information concerning changing circumstances into the thinking process. In terms of

communications theory and intelligence organizations, the closed mind, or closed organization, would be one that failed to respond internally to changes in external signals. Such an organization would fail to "perceive" external changes. At the same time, the open organization would be responsive to changes in the external environment.

By using communications theory, the degree to which an organization was "open" or "closed" could be gauged by comparing the variation between internal and external information flows. Such data would help perpetrators of strategic deception determine whether information concerning a deception had been perceived by an intelligence organization and was being transmitted towards a decision maker. It would also define the receptivity of discrete sensors within a larger organization to varying types of information, since it seems unlikely that the responsiveness of all the units within an organization to all types of information is uniform.

While additional measures exist such as the "quantity of messages," which may enhance information theory-based studies of intelligence organizations, the foregoing discussion highlights what seems to be the two most important concepts of the information approach. The first concerns the reliability with which intelligence organizations transmit information to decision makers, and the second concerns the tendency of organizations to perceive or ignore events.

That decision makers need accurate, undistorted information seems self-evident and basic. From the perspective of carrying out a strategic deception, it would be important to know which channels are likely to transmit a message reliably so that deceivers can be relatively cer-

tain that intended information reached the targets of a deception. Obviously, the best way to insure that a message has been transmitted reliably is to control the communications channel. During World War II the British seemed to be aware of this principle when they provided German agents who had come over to the Allied side with messages and insured that the intended messages were transmitted to the German intelligence organization. While it is true that the British could not control the messages once they began to be passed along within the German intelligence organization, at least they could control the first step along the transmission chain.

The second concept stemming from information theory concerns the receptivity of organizations to information about changes in the environment. In a practical sense, the receptivity concept concerns the reinforcement of existing beliefs or the introduction of new beliefs into an intelligence organization. For example, if the British wanted the Germans to alter their existing beliefs, they would have to direct their deception scheme at points in the German intelligence organization which were sensitive to information about changes in the external environment and which would reliably report those changes to the German decision makers. On the other hand, the British could reinforce existing German beliefs by directing information to points which were unresponsive to or tended to overlook dissonant information about environmental changes.

These principles seem to stem naturally from the information theory principles discussed above. Successfully employing these principles in a deception requires gauging the internal reliability and responsiveness of an intelligence organization. However, it is one thing to control

message inputs at the fringes of an intelligence organization, and quite another to determine whether the intended quality of the message is maintained on its way to the decision makers. Determining whether intended information reaches decision makers requires a reliable feedback loop from points within a target organization to a deceiver. The British were fortunate in that they could rely on ULTRA messages to gauge whether or not information which they were trying either to introduce into or prevent from entering the German intelligence network was being passed along to the decision makers.

Given that they had ULTRA, the question arises whether the British would have been able to make better use of ULTRA if they had systematically employed information theory concepts and measures. Without the requisite empirical evidence--which would be difficult or impossible to obtain anyway--the intuitive response to this question is that information theory concepts are too precise to be operationally useful, and that the British made about as effective use of ULTRA as they could. The British seemed to be intuitively aware of the importance of capitalizing on the differences between German intelligence channels in terms of their reliability and receptivity. But taking greater systematic advantage of information theory for understanding or carrying out a deception would have required feedback information which was more continuous and reliable than the British could be confident of obtaining.

So far, then, it seems likely that for students of strategic deception, knowing the structural and communications attributes of an intelligence organization will reveal many important things. For instance, it will reveal which channels respond most to changes in input, and

which channels most reliably and most quickly transmit input messages to decision makers. At the same time, however, it seems that as a practical matter the requisite empirical information for employing relatively precise structural and information measures is unobtainable. Further, no matter how useful this knowledge might seem, it lacks theoretical richness because it leaves many important questions concerning an organizational approach to strategic deception unanswered. The reason for this may lie in the fact that interaction and communications structures are the empirical manifestation of other phenomena. That is, while structure and communication lend themselves to empirical measurement, no satisfactory explanation emanates from either perspective to explain why a particular structure is as it is, or why information flows through that structure as it does. Further, neither perspective addresses the critical aspect of information in terms of its impact on decisions. That critical aspect is "meaning."

Addressing the issue of meaning requires an examination of the factors which contribute to the meaning assigned to information being processed by an intelligence organization. It is one thing to say that increased variety is being transmitted reliably by an organization, but it is quite another to say that increased variety indicates to an organization or group of decision makers that there has been a favorable or unfavorable turn of events requiring policy action. In other words, a critical variable affecting whether policy makers act on perceived changes in the environment is the meaning which decision makers assign to information.

The matter of meaning is taken up in the next section of this paper.

Before turning to that section, however, it must be pointed out that in the short run a deceiver cannot affect meaning. Perhaps in the long run, through propaganda, bargaining, etc., a deceiver can manipulate the variables which affect the meaning of perceived information, but in the short run, a deceiver can only manipulate input information. That is, a deceiver can introduce information into an intelligence organization, but a deceiver cannot control how that information is interpreted by decision makers. Because of this, a deceiver must understand the variables which affect meaning in order to maximize the likelihood that the target of deception will read the deceiver's signals in the intended way. The significance of this conclusion is amplified in the next section.

INFORMATION PROCESSING

A third perspective which may help solve the problem of understanding how meaning is assigned to intelligence information is the information processing perspective. This perspective emphasizes two concepts: saliency and meaning. Both concepts are relevant in an organizational approach to strategic deception since they help explain why intelligence organizations attend to certain types of information and not others, and why intelligence organizations interpret information one way and not another.

Saliency and meaning are related to a third concept, perceptual framework.¹⁷ The perceptual framework concept emphasizes that decisions are shaped by what people perceive in their environment and how they evaluate it, and that they interpret information by filtering it through a

structured belief system. The belief system amounts to an abstract theoretical system that explains how things work and it provides the basis for making logically consistent decisions. The perceptual framework concept also emphasizes variables which give rise to belief systems. Such variables include ideologies, personality traits, cultural circumstances, and so forth.

A perceptual framework identifies important concepts for decision makers and it contains implicit prescriptions for what information is relevant to those important concepts. Relevant information is salient and attended to; irrelevant information is not salient and is ignored. Johan Galtung explains that nations actively attend to information about those things which are seen (within the context of a perceptual framework) as having either a positive or negative impact on essential needs; that is, as being relevant to the enhancement of goals and to the amelioration of threats.¹⁸ In more concrete terms, nations, for whom energy is an essential need, will attend carefully to information about petroleum. Likewise, when the British felt threatened with a German invasion, they attended very carefully to whatever may have been perceived as relevant to the invasion.

Galtung's conceptualization is helpful in answering questions about what intelligence organizations will attend to and what they will ignore. In the context of strategic deception, it seems reasonable to conclude that knowing what kinds of information are salient to a target of a deception will provide guidance regarding what will or will not be attended to. This conclusion has some basis in empirical fact as the work of Sophia Peterson, who studies how the world's press processes in-

formation,¹⁹ and numerous articles in the Public Opinion Quarterly demonstrate.

Knowing what is salient to a nation's decision makers and, consequently, what is salient to that nation's intelligence organization requires that the perceptual framework which gives rise to saliency be known. Perhaps the most systematic study of perceptual frameworks emanating from nations' foreign policy decision-making mechanisms have been done by Robert Axelrod²⁰ and G. Matthew Bonham and Michael J. Shapiro.²¹ In their respective studies these researchers have attempted to map the linkages among the variables which decision makers and analysts perceive as determining the outcome of an ongoing international relations situation. Axelrod, and Bonham and Shapiro attempt to map the nascent theories, or belief systems, by which policy makers orient themselves to the world.

Axelrod has content analyzed the verbatim records of meetings involving high-level British officials in order to reconstruct the logic of the inchoate theory which the officials used to comprehend and cope with the problems facing Britain in India following World War I. Meanwhile, Bonham and Shapiro have relied on interview techniques in order to tease out the logical relationships which contemporary officials have seen as underlying more recent international relations episodes. Both of these research efforts have employed graph theoretical and matrix algebra techniques to examine belief systems in terms of their internal logical consistency and the perceived relationships between policy options and situational outcomes. With these data and analytic techniques the researchers have attempted to explain discrete foreign

policy decisions by drawing from notions of cognitive consistency and other concepts related to cognitive psychology.

Patrick Morgan has examined the notion of belief systems and likened them to analytical theories, wherein, the cause-effect linkages between policy variables and situational outcomes are analogous to testable hypotheses.²² In this context, the information which intelligence organizations and decision makers process is analogous to data which are used to confirm or disconfirm the propositions which comprise decision maker's inchoate theories. And, just as scientific theories contain assumptions or maxims for determining what is salient information and how such information should be evaluated, belief systems identify salient information and provide the criteria for evaluating it, at least insofar as the information can be said to confirm or disconfirm an analytic belief.

Presumably if deceivers knew the analytic systems of their deceptions targets they could structure their deceptions in terms of the kinds of information the target was seeking. Plus they would have a pretty good idea of how the information would be interpreted within the target's network of beliefs.²³ The British seemed to be at least intuitively aware of these principles as they carried out the grand strategic deception described in Cave-Brown's Bodyguard of Lies.²⁴ In this deception Hitler was deceived into thinking that the main Allied invasion of Europe would be at Pas de Calais, and the Normandy landing would be a secondary diversion. The British had learned what information the Germans were seeking as well as how the information was likely to be interpreted, so that the British were able to reinforce German beliefs by, in effect, consistently confirming them.

The argument that theories of strategic deception must take into account the belief systems of the targets of deception has intuitive appeal. However, in terms of operational usefulness the same problems arise with the belief system concept as arose with the structural and communications concepts. Specifically, in order to be operationally useful, data must be obtained concerning the belief system by which a target evaluates information. And, as in the cases of the structural and communications perspectives, in order to analyze belief systems, analysts must have access to the innermost workings of the target organization.

But, suppose sufficient data were available to permit the accurate mapping of the belief systems by which intelligence organizations processed information. This raises an additional theoretical and operational problem: how to determine which belief system is the one that counts. It is possible to argue that the key decision makers' belief system is the one that counts, because intelligence organizations receive direct or indirect guidance from key decision makers regarding salience and interpretation. However, this argument does not answer the question of how large the circle of key decision makers is. Further, this argument does not answer the question of who, among a group of key decision makers, has the largest impact on the groups' belief system,²⁵ or whether a professionally-staffed intelligence organization does not somehow have its own effect on a general belief system that contributes to or transcends the one held by key decision makers.²⁶

Compounding the problems associated with identifying the belief system that matters and then gaining access to pertinent data is the fact that decision makers as well as organizations learn. Learning is a

continual process, and one of its attributes is that through information processing there is an effort to establish a correspondence, or balance, between sensory information and the framework which is used to comprehend that information. Insofar as external processes and information about those processes change over time, decision makers must alter their belief systems in order to reflect a changing reality. Several important issues are associated with this aspect of learning. They concern whether information is "re-interpreted" to fit existing beliefs, or, conversely, whether belief systems adapt to changes in incoming information. They also concern whether belief systems adapt incrementally or in a step-wise fashion.²⁷

Presumably behavioral changes are connected to learning processes in a systematic fashion so that knowing, say, that step-wise transformations of a belief system precede major policy shifts may prove useful in the context of strategic deception. A deceiver may be interested in eliciting a policy shift from the target of a deception. In order to accomplish this, it may be necessary to know whether the target's belief system was about to undergo a major reorientation. As straightforward as this may sound in principle, it would still be difficult to obtain pertinent data concerning either pending belief system changes or the connection between prior changes and subsequent behavior because of the closeness with which such information may be held.

As an element of the perceptual framework approach, the belief system concept is relatively rigorous, insofar as the connection between belief systems, information processing, and behavior has theoretical precision.²⁸ In contrast, there are other elements of perceptual frameworks

which can be identified, but whose connection to information processing and behavior is difficult to determine. Nevertheless they are important to consider since the argument that they affect the salience and meaning of information is intuitively compelling.

Contained within the general literature of international relations theory is a set of ideas concerned with the factors which affect perceptions and information processing. These ideas suggest that perceptual frameworks are affected, at least indirectly, by such factors as bureaucratic political processes,²⁹ ideologies,³⁰ national culture,³¹ national interests,³² political elites,³³ public opinion,³⁴ the educational and professional backgrounds of decision makers,³⁵ processes of political socialization,³⁶ and so forth. Somehow these variables are supposed to affect the "world views" and decision-making styles of national leaders and, by extension, the manner in which they treat the information which they receive from intelligence organizations.^{37 & 38}

It is plausible to suggest that in the processing of intelligence information it makes a difference if the information processors are civilians or military personnel; if they espouse democratic or authoritarian values, et cetera. Unfortunately, it has never been determined whether differences among countries in terms of how they rate on these variables actually account for differences in perception and behavior.³⁹

This is a routine criticism of the decision-making approach to foreign policy analysis.⁴⁰ But, even though it is routine, it remains valid, and its implication for the analysis of strategic deception may be important, especially when efforts are made to weave these variables into a theory of deception.

So far, most of the concepts discussed in this paper, at least in theory, are amenable to rigorous operationalization, but they have been represented as nonoperational for analyzing strategic deception because relevant data are unobtainable. In contrast, it is relatively easy to obtain background information about the targets of deception so that, at least, detailed historical descriptions of the factors which indirectly affect perceptual frameworks can be compiled. Intelligence organizations already routinely compile such information. For instance, they create biographical sketches of key personnel in foreign countries; they compile sociological and cultural data concerning potential enemies; or, they monitor public opinion in foreign countries. Despite the fact that information concerning these variables is easy to collect, the problem of relating these variables to decision-making and information processing with empirical precision remains unsolved. Thus, even though deceivers may possess such information, how to use it in a deception is not self-evident--at least not within the framework of an organizational approach to strategic deception.

This is not to suggest that background information is valueless. Indeed, it may have considerable value if it gives deceivers and analysts special insights regarding their target. At the same time, however, it is difficult to see how a systematic connection can easily be made between variables such as culture, public opinion, etc. and the perceptual frameworks which affect the role of organizations in strategic deception. This conclusion seems to apply at the level of individual cases as well as across cases.

SITUATIONAL CONTEXT

The preceding sections of this paper have explored the role of intelligence organizations in strategic deception from three perspectives. While initially promising to be useful in general theoretical analyses of organizations' roles in strategic deception, upon closer inspection, each perspective displayed some fundamental flaw which undermines its potential to support systematic theory. This generalization seems to hold also for the situational context perspective.

The situational context perspective does not focus on the attributes of intelligence organizations such as their structure, their information transmitting capability, etc. Instead, it focuses on variables which are exogenous to intelligence organizations but which, nevertheless, seem to affect the ways in which information is processed.

Drawing distinct lines between situational and non-situational variables is difficult and for the time being must be done arbitrarily. One criterion for making the distinction might be to ask on the one hand if variables are likely to remain stable in the long run or to change only as a result of routine processes, such as elections, or on the other hand if variables can change unexpectedly. Variables falling into the latter category might be considered situational variables. By this criterion, one clearly situational variable is international crisis, into which is folded the notions that crises occur unexpectedly and represent dramatic departures from normalcy.

In the field of international relations, crises have been studied from two analytic levels. One level focuses on the interactions be-

tween countries during times of crisis, and the other focuses explicitly on foreign policy decision-making. At the interaction level of analysis, Charles McClelland has demonstrated that the quantity and variety of events taking place between countries embroiled in a crisis rise dramatically.⁴¹ In terms of a concept presented earlier in this paper, what McClelland found was that during acute international crises the information input to crisis participants exceeds normal thresholds. From another perspective, Charles F. Hermann has hypothesized that the internal decision-making environment changes during crisis so that crises catch decision makers by surprise, appear to be highly threatening to national security, and demand a quick response.⁴²

A general assumption underlying international crisis research is that a crisis situation is one that has gotten out of control and is equally acute for all participants. From the standpoint of strategic deception, however, it is easy to see how a deceiver might manipulate inputs to a target by increasing the quantity and variety of events in order to surprise the target and to make things appear as though the target was threatened and had a short time in which to react.

While it is possible to suggest that deceivers to some degree can manipulate the situational context of a strategic deception, the behavioral consequences of doing so are difficult to determine--at least insofar as creating an aura of crisis is concerned. This seems true because the level of tolerance which countries have for ambiguity and the point at which they cross from a normal information processing mode to a crisis mode has never been determined empirically. That is, it has never been determined how to account for differences in the tolerance levels between

countries or for differences in individual countries from one time to the next. These facts coupled with the fact that few historical cases of international crises exist to support a general theory present a circumstance similar to those encountered with the three analytic perspectives discussed previously. Even so, it is possible to suggest at least one empirical consequence for organizational information processing during crises based on evidence generated in the field of cognitive psychology.

The evidence suggests that periods of stress have an impact on the way people--and presumably intelligence organizations--process information. What seems to happen is that, during the early phases of stress situations, peoples' information processing capabilities actually increase as they tune into the situation. However, after a certain threshold has been crossed, and the quantity and variety of message inputs continue to increase, the reliability of internal message transmission falls below what it was before the emergence of the stressful situation. In short, during times of acute stress, the internal transmission of information collapses.⁴³

The meaning of this finding in the context of strategic deception is unclear. As McClelland's research demonstrates, the international response to stress is a breakdown in normal interaction patterns. From this, it might be argued that deceivers would not want to create a crisis-like situation characterized by unpredictable responses, since one of a deceiver's objectives might be to evoke predictable, but wrong, responses from the target of a deception. However, McClelland's research notwithstanding, one objective of a strategic deception simply could be to "freeze" an opponent's responses. This might be accomplished by increas-

ing the quantity and variety of input beyond a critical threshold in order to force a collapse of internal information transmission. So long as the increased possibility of evoking an unpredictable response is recognized and deemed tolerable, a deceiver may find it useful to create a crisis-like situation in order to gain a short term strategic advantage.

In assessing the fruitfulness of the situational context perspective for analyzing the role of intelligence organizations in strategic deception, the conclusion emerges that some of the problems associated with the perspectives explored earlier also plague the situational context perspective. These problems concern the availability of data for studying single cases as well as for comparing several cases. As with the previous perspectives, it is possible to argue that it would be difficult to gauge the internal effects on information processing which may stem from changes in situational variables because of researchers' inability to obtain requisite feedback information. Similarly, it would be difficult to arrive at general conclusions about the role of situational variables in strategic deception because of the small number of historical cases from which to glean data. Against these general shortcomings with the situational perspective it is possible to balance the fact that some evidence exists which links stress to information processing. Unfortunately, the linkage has not been demonstrated unequivocally in a situation involving international relations, and its meaning for deception is unclear.

CONCLUSION

From the preceding, it should be apparent that an organizational

approach provides some insights into how to think about the role that intelligence organizations play in strategic deception. At the same time, however, it should be apparent that there are severe obstacles which for the present preclude the systematic application of an organizational approach to deception. This conclusion seems to apply at the theoretical level as well as at the operational level. It stems from the facts that the empirical base for studying strategic deception is small and that rigorously applying an organizational approach in order to carry out a deception requires information about a target that is more continuous, more reliable, more precise, and wider in scope than can reasonably be obtained. The conclusion stems also from the fact that little is known about the way in which intelligence organizations process information, or about the effect that information processing has on foreign policy decision-making.

Despite the fact that an organizational approach does not seem to lend itself to the systematic study of strategic deception, considering organizational variables seems useful in both a pre-theoretical exercise, such as this, and in actual attempts to engage in deception. For instance, knowing that organizational information processing can be important in shaping foreign policy decision alerts analysts and policy makers to the idea that any attempt to analyze or perpetrate a strategic deception must always address whether or not organizational factors play a role in determining what messages finally reach decision makers. Reading the extant historical analyses and narrative accounts of strategic deception gives the impression that organizational factors are not usually taken into consideration, or consciously dismissed as being

insignificant for well-argued theoretical or empirical reasons.

Systematically drawing attention to the potential importance of intelligence organizations in determining deception outcomes does more than simply alert policy makers to the fact that they ought to take intelligence organizations into account when perpetrating a deception.⁴⁴ It illuminates and shows how to consider some things which may ultimately determine the outcome of a particular deception. And, even if these things cannot be analyzed systematically within the context of a single deception, if policy makers are conscious of their potential importance, they may be taken into account in order to provide greater insight into how to tailor a particular deception so as to increase the likelihood of its success.

Insuring a deception's success in the sense that intended messages reach a target requires a deceiver to have feedback concerning the actual messages which decision makers receive from their intelligence organization. Without feedback, it seems the likelihood for the success of a strategic deception is reduced. From the preceding discussion it is clear that in order to systematically apply each of the analytic perspectives to a strategic deception, the deceiver must somehow tap a target's internal information flow. At the same time, it is also clear that the likelihood of tapping internal information flows to obtain data sufficiently rich to support systematic analyses in terms of the four perspectives discussed here seems remote. However, so long as a deceiver does not aspire to analytical rigor, but seeks only sufficient information to gauge a target's internal response to information input, the level of information required by the four analytic perspectives may not

be required to carry out a deception. All a deceiver may actually require is reasonable assurance that intended messages reach their destination and have their intended effect. For example, the British had ULTRA, and could use it to gauge the effects of their deception schemes and to determine when it was necessary to alter input information. For their purposes, the feedback provided to the British by ULTRA was sufficient, but without ULTRA the British could only guess at the organizational response to their schemes.

FOOTNOTES

¹ Anthony Cave-Brown, Bodyguard of Lies (New York: Harper and Row Publishers, 1978).

² Ronald Lewin, Ultra Goes to War: The First Account of World War II's Greatest Secret Based on Official Documents (New York: McGraw-Hill Book Company, 1978).

³ R. V. Jones, The Wizard War, British Secret Intelligence, 1939-1945 (New York: Coward, McCann and Geoghegan, Inc., 1978).

⁴ Roberta Wohlstetter, Pearl Harbor: Warning and Decision (Palo Alto, CA: Stanford University Press, 1962).

⁵ Robert A. Axelrod, "The Rational Timing of Surprise," World Politics, 31, 2 (January 1979), 228-246.

⁶ Karl W. Deutsch, The Nerves of Government: Models of Political Communication and Control (New York: Free Press, 1964).

⁷ See, for example, W. Ross Ashby, An Introduction to Cybernetics (New York: University Paperbacks, 1971); and Design For A Brain (New York: Barnes and Noble, 1960).

⁸ This is a research tradition established over thirty years ago by Robert F. Bales, Interaction Process Analysis: A Method for the Study of Small Groups (Chicago, Illinois: University of Chicago Press, 1951).

⁹ The person who is most renown for depicting and analyzing group as well as other structures on matrices is Frank Harary. The fundamental procedures are explained in Frank Harary, Robert Z. Norman, and Dorwin Cartwright, Structural Models: An Introduction to the Theory of Directed Graphs (New York: Wiley, 1965). Harold Wilensky deals descriptively with organizational structures and their effect on intelligence. See Harold L. Wilensky, Organizational Intelligence (New York: Basic Books, 1967).

¹⁰ Alex Bavelas, "Communication Patterns in Task-Oriented Groups," reprinted in Group Dynamics: Research and Theory, ed. Dorwin Cartwright and Alvin Zander (2d. ed. rev.; Evanston, Ill.: Row, Peterson, 1960), p. 669.

¹¹ Harary, Norman, and Cartwright, op cit., pp. 371-391.

¹² The work of Bavelas has been mentioned already in this regard. For additional amplification, see James L. Price, Handbook of Organizational Measurement (Lexington, MA: D. C. Heath, 1972); Victor H. Vroom (ed.), Methods of Organizational Research (Pittsburgh, PA: University of Pittsburgh Press, 1967), and James D. Thompson (ed.), Approaches to Organizational Design (Pittsburgh, PA: University of Pittsburgh Press, 1966).

¹³ Wohlstetter, op cit., 1962.

¹⁴ Among communications theorists, the fundamental metric is known variously as the "information measure," and "entropy measure," the "measure of ambiguity," the "uncertainty measure," or H-rel. Choosing any of these terms depends mainly on the context of any particular theoretical discussion.

¹⁵ Wendell R. Garner, Uncertainty and Structure as Psychological Concepts (New York: Wiley, 1962).

¹⁶ Milton Rokeach, The Open and Closed Mind (New York: Basic Books, 1960).

¹⁷ "Perceptual framework" is employed here to refer roughly to the same concepts as "decision-making framework," and "cognitive framework." It is also related to the concepts of "operational code," and "perception." Definitions for these concepts may be found respectively in the works of Richard Snyder, Robert Axelrod, Alexander George, and Robert Jervis. For further information, consult Richard Snyder, H. W. Bruck, and Burton Sapin, "Decision-Making as an Approach to the Study of International Politics," Foreign Policy Decision-Making, eds. Snyder, Bruck, and Sapin (New York: Free Press, 1962), 14-185; Robert A. Axelrod, ed., Structure of Decision: The Cognitive Maps of Political Elites (Princeton, NJ: Princeton University Press, 1976); Alexander L. George, "The 'Operational Code': A Neglected Approach to the Study of Political Leaders and Decision-Making," International Studies Quarterly, 13, 2 (June 1969), 190-222; Robert Jervis, Perception and Misperception in International Politics (Princeton, NJ: Princeton University Press, 1976). For a discussion of the role of preconceptions in the intelligence process, see Wilensky, op cit.

¹⁸ Johan Galtung, "Small Group Theory and the Theory of International Relations," New Approaches to International Relations, ed. Morton Kaplan (New York: St. Martin's Press, 1968), 270-302.

¹⁹ Sophia Peterson, "Events, Mass Opinion, and Elite Attitudes," Communication in International Politics, ed., Richard L Merritt (Urbana, Ill.: University of Illinois Press, 1972), 252-271.

²⁰ Axelrod, op cit.

²¹ For an example of Bonham and Shapiro's work see G. Matthew Bonham, Michael J. Shapiro, and George J. Nozicka, "A Cognitive Process Model of Foreign Policy Decision Making," Simulation and Games, 7, 2 (June 1976), 123-152.

²² Patrick M. Morgan, Theories and Approaches to International Politics (2d. ed.: New Brunswick, NJ: Transaction Books), 17-18.

²³ Actually this is a fundamental principle of cognitive psychology and human information processing. An argument for its applicability to international relations appears in Jervis, op cit.

²⁴ Cave-Brown, op cit.

²⁵ There is evidence which suggests that this may be a spurious objection to the study of belief systems since it has been shown that as a group interacts over time, the opinions, interpretations, values, etc. of the group's members tend to coalesce. See Bernard Berelson and Gary A. Steiner, Human Behavior: An Inventory of Scientific Findings (New York: Harcourt Brace and World, Inc., 1964).

²⁶ The best known author who deals--at least indirectly with this question--is Graham Allison. For an introduction see Graham T. Allison, "Conceptual Models of the Cuban Missile Crisis," American Political Science Review, 63, 3 (September 1969), 689-718.

²⁷ For a discussion of these and other issues as they relate to foreign policy decision-making as well as to general human information processing, see Harold M. Schroder, Michael J. Driver, and Siegfried Streufert, Human Information Processing: Individuals and Groups Functioning in Complex Social Situations (New York: Holt, Rinehart and Winston, 1967). More formal treatments of these matters may be found in Robert S. Wyer, Jr., Cognitive Organization and Change: An Information Processing Approach (New York: Wiley and Sons, 1974); and Herbert L. Pick, Jr., and Elliot Saltzman, eds., Models of Perceiving and Processing Information (New York: Wiley and Sons, 1978).

²⁸ See Axelrod, op cit., and Bonham and Shapiro, op cit.

²⁹ Graham Allison, op cit.

³⁰ H. W. Cummins, Mao, Hsiao, Churchill and Montgomery: Personal Values and Decision-Making (Beverly Hills, CA: Sage Publications, 1974).

³¹ Charles E. Lindblom, The Intelligence of Democracy (New York: Free Press, 1965).

³² Donald E. Neuchterlein, "The Concept of 'National Interest': A Time For New Approaches," Orbis, 23, 1 (Spring 1979), 73-92.

³³ Daniel Lerner and Harold Lasswell, eds., World Revolutionary Elites (Cambridge, MA: MIT Press, 1965).

³⁴ Sophia Peterson, op cit.

³⁵ Johan Galtung, "Foreign Policy Opinion as a Function of Social Position," Journal of Peace Research, 1 (1964), 206-231.

³⁶ Gabriel A. Almond, Political Development (Boston: Little Brown and Company, 1970).

³⁷ Cummins, op cit.

³⁸ Edwin S. Shneidman, "Logic Content Analysis: An Explication of Styles of Concludifying," The Analysis of Communication Content: Developments in Scientific Theories and Computer Techniques, eds., G. Gerbner, et al. (New York: Wiley, 1969).

³⁹ Ole R. Holsti, "Cognitive Process Approaches to Decision-Making," American Behavioral Scientist, 20, 1 (September/October 1976), 11-32

⁴⁰ For further amplification see Harry H. Ransom, "International Relations," Journal of Politics, 30, 2 (May 1968), 345-371, as well as the authors cited therein.

⁴¹ Charles A. McClelland, "Warnings in the International Events Flow," International Interactions, 5 (Summer 1978), 135-202; and "The Beginning, Duration, and Abatement of International Crises," International Crises: Insights From Behavioral Research, ed., Charles F. Hermann (New York: Free Press, 1972), 83-108.

⁴² Charles F. Hermann, ed., "Threat, Time, and Surprise: A Simulation of International Crisis," International Crises: Insights From Behavioral Research (New York: Free Press, 1972), 187-211.

⁴³ This finding has been demonstrated by Schroder, Driver, and Streufert, in a simulated international relations decision-making situation. The authors' research corroborates the widely known work of others cited in Schroder, Driver, and Streufert, op cit.

⁴⁴ As stated earlier, the British seemed intuitively aware of the German intelligence organization and its effect on whether Hitler would be deceived. On the matter of guarding against being deceived, a sort of "intelligence failure," there is considerable writing. For example, see Richard K. Betts, "Analysis, War, and Decision: Why Intelligence Failures Are Inevitable," World Politics, 31, 1 (October 1978), 61-89.

TECHNICAL PERSPECTIVES ON DECEPTION

William Reese

The systematic study of deception is not firmly identified with any existing discipline nor is it established as a recognized specialty in its own right. Rather it seems a topical subject, perhaps on the ascendency because a number of accounts of deceptions during WW II are now appearing. The literature of deception is dominated by accounts of particular deceptions. Such literature constitutes data, but without a framework for theoretical interpretation, such data constitutes a confusing mass of particulars rather than an organized body of knowledge deserving even the label protodiscipline.

A logically prior condition for erecting a suitable theoretical framework is that there be some agreement on the key concepts which must be incorporated in this framework and the key issues with which it must deal. As was noted by von Neuman and Morganstern as they set forth on the task of providing a theoretical framework for economics in the theory of games:¹

There is no point in using exact methods where there is no clarity in the concepts and issues to which they are to be applied. Consequently, the initial task is to clarify the knowledge of the matter by further careful descriptive work.

It is in this spirit that the following three essays, dealing with an examination of deception from the perspectives of established technical disciplines, were written.

Not only do these essays attempt to view deception from perspectives of established technical disciplines and thus clarify some key

concepts and issues, but their point of view, a product of the authors' intellectual origins as "hard scientists," is also technical. That is, they view the goal of the venture as developing a theory of the sort used in the physical and engineering sciences. This goal has been well described by Anderson:²

The goal of scientific theory is to reduce the complexity found in nature to a few general laws. If human behavior is not amenable in terms that are much simpler than the behavior, it is not really amenable to scientific analysis. It is better to have a simpler theory that is incorrect in some details than a theory that is too complex to handle.

Consequently, the aim of the essays is to examine general concepts which emerge from technical disciplines and attempt to determine what insights they give about the problem of deception. These essays examine concepts in communications theory, game theory and systems theory and relate these concepts to the problem of deception. They are intended for a non-specialist audience who has no real exposure to these disciplines.

Examining deception from these three perspectives allows different aspects of the problem to be emphasized. However, all three perspectives show that feedback allowing the deceiver to monitor the impact of information reaching the intended target should play a critical role. In the communications and systems theory frameworks feedback permits the deceiver to overcome uncertainties in predicting the response to a given stimulus which arise due to random events and imperfect organizational behavior in obtaining and interpreting information. From the game theory perspective feedback encourages attempts at deception because it can remove many, if not all, of the penalties of being discovered.

The communications theory perspective emphasizes the limitations of the communications paradigm to the deception problem. It further indicates that the "signals and noise" analogy used in several discussions of warning and deception use these terms in a manner radically different from the way they are employed in the original communications theory framework. The communications approach shows that deceptive communications need to be considered as a dual process--first encoding the deceptive message as a series of concrete indicators and second transmitting the indicators. The second process is more amenable to discussion in a communications theory framework if it is possible to introduce the process by which channel guardians validate the received indicators into the paradigm. The first process, that of embedding and extracting deceptive messages as a series of indicators, does not transfer well into a classical communications theory framework because, without feedback or unusual organizational predictability, the existence of a host of human and organizational factors which cannot be anticipated preclude confident encoding of the message.

The game theoretic framework emphasizes the value of occasional deception in reducing one's own predictability. In addition, using a zero sum game structure in which the basic problem is whether to believe or disbelieve a received message, an analysis is conducted which shows that the normally preferred strategy is to postpone choice awaiting further information so long as (it is assumed that) there exists a significant probability of the situation clarifying in time to take appropriate action. The alternative, which exists when significant probability of timely discovery does not exist, is to choose

in a highly unfavorable situation where loss rather than gain is the expected outcome. Since a tendency to wait in ambiguous situations seems an important factor in many actual cases, this insight from game theory is probably a key concept in understanding the success of deception.

The system theory framework focuses on the sets of stimuli and responses received and emitted by the interacting players in a potentially deceptive situation. This framework illuminates the problems of the top level communications process caused by uncertainties and delays. This viewpoint suggests that experience in prediction gained during one type of interaction (e.g. peacetime) may not transfer to other conditions of interaction (e.g. crisis) since the system which needs to be predicted may be undergoing rapid internal change. The approach further suggests that deceptive signaling ought to be at a rate low compared with the inherent error rates of the channels employed. Consequently, frequent attempts at deception require the use of inherently error-prone channels. Finally, the systems approach suggests that active attempts at "counterdeception" ought to be an efficient tool for unmasking suspected deception.

FOOTNOTES

¹John von Neuman and Oskar Morgenstern, Theory of Games and Economic Behavior (Princeton, NJ: Princeton University Press, 1947), p. 4.

²John R. Anderson, Language, Meaning and Thought (Hillsdale, NY: Lawrence Erlbaum Associates, 1976), p. 17.

DECEPTION WITHIN A COMMUNICATIONS THEORY FRAMEWORK

William Reese

THE COMMUNICATIONS THEORY PARADIGM

Communications theory focuses on the problems of transmitting information between a sender and a receiver. The classic paradigm is that shown in Figure 1 of source, encoder, channel, decoder and destination. A typical illustration of this paradigm is that of radio transmission. The source can be considered either as someone speaking into a microphone or the electrical signals emerging from the microphone. The encoder is the radio transmitter which impresses the source signal on a radio wave. The channel is that portion of the electromagnetic spectrum employed for the transmission and the physical pro-

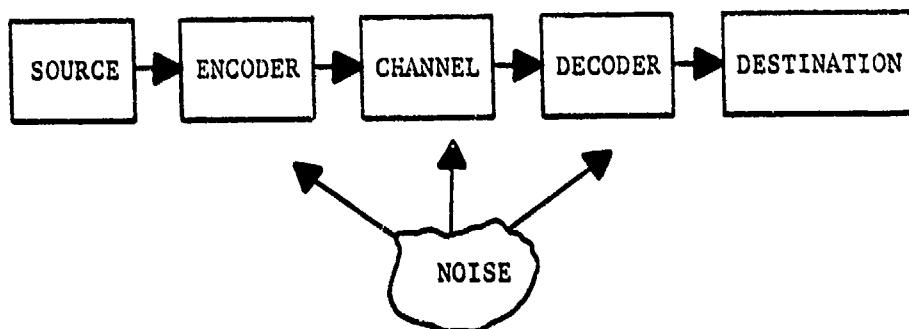


Figure I - The classic communications theory paradigm

pagation of the electromagnetic wave emitted by the transmitter to the receiver. The decoder is the receiving apparatus which converts the received electromagnetic signal either into an electrical signal suitable for driving a loudspeaker or to the radio signal produced by the loudspeaker. The destination is then either the loudspeaker or the listener.

The theoretical structure of communications theory is based largely on understanding the effects of extraneous, random signals (noise) which are introduced between the source and destination. The generic problem is the analysis of the transference of information generated by the source to the destination under constraints introduced by the nature of the channel, the noise environment and various exogenous factors.

Application of this paradigm to deception will be made by associating these elements with the deception problem, then by elaborating this association through consideration of a simple problem and finally by raising certain conceptual issues which the problem of deception introduces into the communications theory context.

Deception is a process in which, through inverted signaling, a deceiver D attempts to cause a target T to act in a manner which will further the operational plans of D to T's detriment. An inverted signal is a signal whose "true meaning" is opposite its purported meaning, in other words, a lie. Within the context of deception, the source can be identified as the operational planner, i.e., the person or organization which determines the objectives of the deception in terms of a statement of what is to be accomplished. Similarly, the destination is to be identified either as that person or organization which can direct or cause the desired action to take place or those persons or organizations who supply the information on which the decision to act will be taken. The remaining elements of the deception process are then to be embedded in the encoder, the channel and the decoder.

The role of the encoder in the communications paradigm is to con-

vert the source message (which is to lead T into taking the desired action) into a form which is suitable for transmission over an available link (channel) and which will be interpreted by the target in the desired way. Viewed in this fashion, the encoder encompasses the deception practitioners and apparatus (technical and non-technical) which they employ. The issue for the encoder is, given knowledge of the characteristics of the channel and of the processing at the destination end to devise a set of specific signals or indications which will be interpreted by the destination in the manner desired by the source.

The channel represents the specific means by which the message devised by the encoder is delivered to the receiving end. It is characterized by such factors as its physical form (radio transmission using specific signal formats and frequencies, arrangement of images in a photograph, words in a written text, etc.), the time delays associated with the transmission-reception process and by the nature and normal frequency of random events which might corrupt the message as it travels from sources to destination.

The role of the encoder in the communications theory paradigm is to convert the output of the channel (electromagnetic waves striking an antenna, an exposed photographic negative, a document obtained by either overt or covert means, etc.) into a form suitable for use by the destination. This will normally involve some technical processing such as conversion of the electromagnetic signal into electrical signals and then perhaps into printed symbols, development of the photographic negative, possible decoding of text, possible translation,

etc. Since it is rare for the destination to interact directly with the information at this stage, there are normally additional decoding stages in which the information is interpreted, i.e., significance is attached, and the information is passed to the ultimate destination. The existence and nature of these additional decoding steps cause problems when the normal communications theory paradigm is applied to deception.

The final element of the communications theory paradigm is noise, random occurrences which corrupt the signal between source and destination. Following Roberta Wohlstetter's discussion of Pearl Harbor,¹ the signal to noise analogy has been prominent in discussions of the warning problem, a problem intimately related to the deception problem. As used by Wohlstetter, noise represents the plethora of materials, obtained through a variety of channels (communications intercepts, attache reports, public document, negotiations, etc.), which obscured the relevant material (those identified by hindsight as seeming to clearly portend the attack) and made its interpretation either ambiguous or even occasionally inconsistent with an attack.

This concept of noise is poor approximation of the notion of noise used in communications theory. As Wohlstetter's treatment makes clear, the location of this noise was in the concerned decision-making centers and their supporting intelligence organizations. We have previously identified these as the destination part of the communications paradigm. From this viewpoint the messages which Wohlstetter views as signals and noise become a plethora of competing signals, some of which conflict to a greater or lesser degree, some of which reinforce to a greater or lesser degree, and most of which have little or no relationship

to each other. The problem of Wohlstetter's noise then becomes transformed into one of decision-making under uncertainty, a problem of inference whose solution is not fostered by typical noise reduction strategies.

A second significant problem is also associated with Wohlstetter's construct. This objection, raised by Whaley,² is that in cases where deception is possible the main problem is not so much separating important signals from obscuring noise as it is one of deciding on the validity of possible signals, i.e., is it a true signal or an inverted signal (sprignal).³ This problem is made especially difficult since the deceiver presumably takes pains that the inverted signal will not be totally obscured by noise. This validity issue is an important one, in fact one of the key issues involved in extending communications theory to a deception context. Thus we will defer discussion to a later point in the paper.

If we discount the Wohlstetter identification, how shall noise be introduced into the mapping of deception onto communications theory in a way which does not obscure the validity issue? The natural way is to retain the analogy with the communications model as closely as possible, i.e., to reserve noise for those random events which obscure and garble a transmission from source to destination. Typical noise events might be not using the correct model typewriter in producing a forged document (noise in the encoder), a double agent elaborating on the story which has been fed to him (noise in the channel) or a photointerpreter failing to study a film closely enough to discover the clue which was fabricated for his benefit (noise in the decoder). If noise is strictly interpreted in this way, it can be associated as a

channel characteristic, an association which promises to have utility in using some of the insights of communications theory as a tool for dealing with certain problems of deception and counter-deception.

Before leaving this initial exploration of the basic communications theory paradigm, one additional concept which is much used in communications theory needs to be introduced--that of channel capacity. Channel capacity relates to the rate at which different signals can be transmitted over the channel. Channel capacity is not an intrinsic property of a channel, but one which is determined by the physical characteristics of the channel, its noise characteristics and the encoding-decoding scheme employed. While the concept of channel capacity plays a key role in many communications theory considerations, its role in understanding the deception problem is unclear at the moment. One reason for this is that inverted signaling normally is performed at a low information transfer rate compared to the limits of the channels employed for their transmission since the rate requirements are normally set by the ability of the destination to react rather than to receive information.

In order to set the stage for our next development, let us consider a hypothetical deception problem in the communications theory context. Consider a ground warfare confrontation between two sides which we shall call Green and Purple. Green has generally superior forces and has been advancing on Purple. However, at present Purple has an advantage in terms of terrain for the only possible avenues for further Green advance are through two valleys, Eastside and Westside. The Green commander's estimate of the situation is that he could force passage through either of these two valleys with a suitable concentration

of forces, but only at the expense of heavy casualties. Conversely, the Purple commander's estimate of the situation is that his only possibility for success in avoiding defeat is to stop the Green advance, which he can only accomplish by an abnormal concentration of his troops along the avenue of advance chosen by the Green forces.

The situation which has been set out is one in which the possible moves are rather obvious. Purple can divide his forces and face almost certain defeat or he could concentrate his forces and have a chance to defeat Green. However, he must choose correctly, for if he concentrates his forces on Eastside and Green attacks on Westside, he will be routed. Clearly Purple commander will be vigorously urging his intelligence assets to bring him every indication of Green's likely direction of advance. Equally clearly, Green commander will be strongly tempted to try to lead Purple commander to misallocate his forces. If he succeeds, he will accomplish his goal with far less cost. Thus, Green commander directs his staff to develop plans for an attack on Westside covered with a deception effort to lead Purple commander to concentrate his forces on Eastside.

Within the context we have chosen, the source (Green commander) has generated a desired message, i.e., "we will attack on Eastside." The next step is for the deception planning staff to develop a means for transmitting this message to the Purple commander. Because of Purple's aggressive search for information, several possible channels will exist for sending the message, all related to Purple intelligence capabilities. One channel might be through the photo-reconnaissance flights which Purple is known to mount, another might be through radio traffic which Purple is known to monitor, and yet another channel might be planted

information provided Purple by misleading captives or false captured documents. Because of the risks involved in the latter channels, and because there is reasonable likelihood of success using less risky channels, let us suppose that the Green staff selects the first two channels. Let us consider in detail the first, that involving Purple's photo-reconnaissance.

The problem for the deception planners is twofold: to give the impression of an attack on Eastside and to hide the preparations for an attack on Westside. Since the use of armor as a spearhead of attacks has been a feature of Green's doctrine, this suggests that Purple will be most interested in finding the location of tank concentrations. Thus, it will be important to provide camouflage for the tanks massing on Westside and to provide a number of credible dummy tanks on Eastside. At this point one phase of the encoding stage has been accomplished. The general message "The attack will come at Eastside" has been translated to specific messages "Tanks are massing on Eastside. Tanks are not massing in Westside." The specific messages are capable of implementation.

The next step in the encoding process is to actually carry through the implementation. This will involve a certain amount of planning, selecting the sites for the dummy tanks and sites where the actual tanks can best be hidden without impairing their operational effectiveness, and choosing the personnel responsible for emplacing the dummy tanks and the camouflage, a certain amount of logistics, insuring that the required material and personnel for the simulation and dissimulation tasks are available at the times and places needed. It will finally involve a certain amount of manipulation of the physical environment

erecting dummy tanks and either associated entities such as POL dumps and incoming tracks, etc. At this point the messages, "Tanks are massing on Eastside but not Westside" are converted into physical symbols, e.g., dummy tanks, dummy POL dumps, tracks in the dirt, camouflaged tanks, camouflaged POL dumps, and an absence of tracks where tanks should not be. In the strictest sense these physical symbols, represent the signals by which the message is to be transmitted.

An interesting question, which need not be of immediate concern here although it is of vital concern to the Green deception operatives, involves the degree of verisimilitude required for the dummy tank concentration. Will Purple photo-reconnaissance be of sufficient quality that tracks can be studied in detail? Will optical or optical plus infrared imagery be employed? Does Purple possess unintentional radiation detectors capable of identifying the presence of tank engines or of determining numbers of tank engines present? Can these resources be expected to be used against the intended dummy and real sites? Failure to attend to such details can lead to the eventual failure of the signals to be decoded as intended. To the extent that these failures to attend to critical details are a result of accidents or carelessness, they could be classified as noise, but a type of noise which is apt to invert rather than corrupt the intended signal. Thus it is probably better to characterize such failures as encoder errors. To the extent that these failures are a result of a failure to fully appreciate Purple's reconnaissance approach, failures to attend to critical details represent something else, the existence of unappreciated channels.

The next step in the process is one of transferring the physical

symbols erected for the benefit of Purple's photo-reconnaissance into new physical symbols suitable for further processing, in this case images on film to be studied by Purple photo-reconnaissance flights.

There are numerous possible sources of noise which might enter: the Purple photo-reconnaissance may fail to cover the desired locations, the flight may be aborted or lost, the cameras may not work properly or the film may be misprocessed.

Assuming that none of these unfortunate events transpires, the next step in the message transmission process involves the decoding process. The physical symbols which Purple has gathered must be reconstructed into signals which depict a message. This process chiefly involves a photo-interpreter examining the results of the photo-reconnaissance mission, discovering the dummy tanks, which he interprets as real tanks if the Green deception operatives do their job properly, and issuing a report to the effect that so many tanks are located in a particular location. Perhaps the same photo-interpreter or another one will examine the photographs from the Westside mission and, if all goes well for Green, not discover the camouflaged tanks. Again a report will be generated concerning the presence or absence of tanks on Westside. At this point part of the decoding process has transpired, that part which exactly reversed the implementation portion of the encoding process. Specific messages, "Tanks are massed on Eastside" and "Tanks are not massed on Westside" have entered into the Purple intelligence systems.

The next step is for these two messages to be merged with each other and perhaps with messages from other channels, to form the central message "Because tanks are massed on Eastside rather than Westside, the attack is to be expected on Eastside." The steps by which

this merger of separate "micro-messages" into a single "macro-message" takes place, and their relationship to the communications theory paradigm is somewhat obscure. However, this process, which is normally called analysis, is clearly a key hurdle between source and destination. If this hurdle is successfully cleared, then it can be expected that the desired message will reach the destination.

REFINEMENT OF THE COMMUNICATIONS THEORY PARADIGM

The hypothetical example just considered provides a framework for refining and extending the concepts of communications theory as a framework for deception. The first observation is that both the encoding and decoding processes have two parts. In one part specific micro-messages, which we will now call indicators, are generated, transmitted and received. In the second part a macro-message is enfolded into and extracted from the indicators. Thus we are led to the dual scheme depicted in Figure 2. The outer encode-decode process (level 1) corresponds to the design-interpretation functional view of communications advanced by Thomas.⁴ The inner process (level 2) corresponds closely to the conventional view of communications in which the significance of the communicated signals is not an issue.

According to the schema of Figure 2, one must deal with a two-level hierarchy of signals as well. On one level the indicators serve as the signals which convey the main message. This is the context in which Wohlstetter uses the signal-to-noise analogy. On the second level the indicators themselves become messages which are transferred by a variety of physical signals. It is within this context that communications theory concepts apply most naturally.

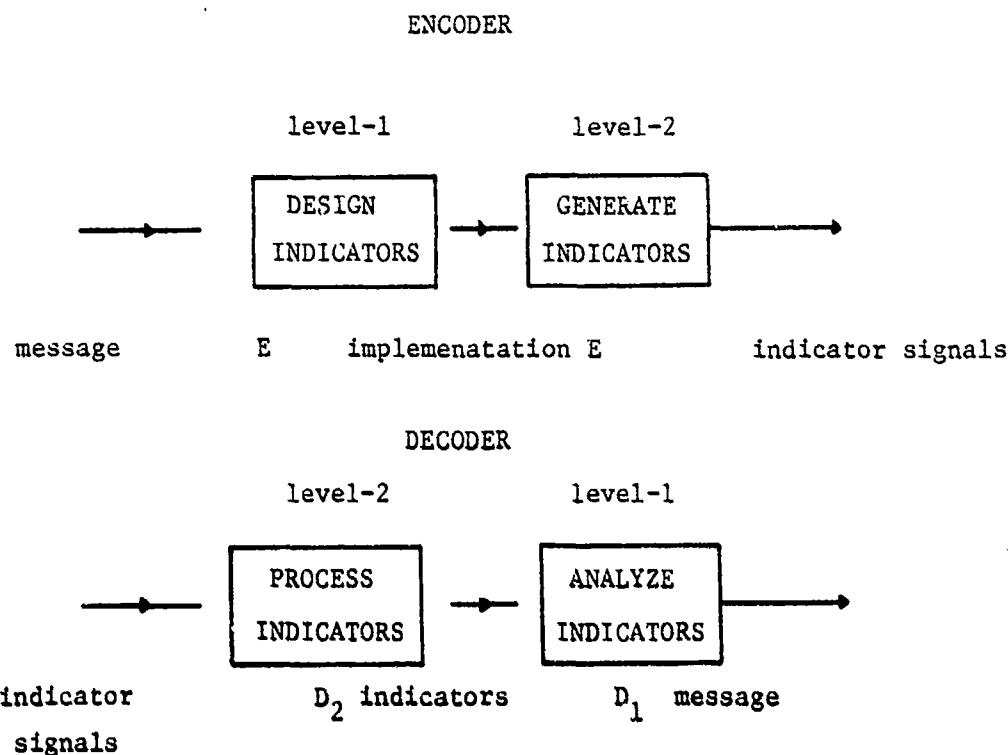


Figure 2. Dual encoder-decoder scheme required to embed deception in a communications theory framework. The first process (E_1 & D_1) embeds and extracts the message into a sequence of indicators. The second process (E_2 & D_2) transmits the indicators.

A somewhat similar view of the communications process between opponents was introduced by T.P. Rona in his discussion of information war.⁵ Rona's schema is illustrated in Figure 3. The level 1 encode-decode process of the present schema applies to the generate interpret boxes in Rona's schema. The other of Rona's boxes applies to the level 2 process.

The observation that communications on level 2 involve injecting indicators into sensor channels of the opponent suggests that on this

level there exists communications between "channel exploiters" on the transmitting side and "channel guardians" on the receiving side.⁶

When confined to level 2, the problem of deception becomes a requirement that the channel exploiters generate indicators which the channel guardians will accept as valid. Unless this can be accomplished there is little chance for the macro-message, whose signals are the level 2 indicators, to be transmitted successfully.

Let us next examine some aspects of the validity problem for level 2 transactions implied by the above discussion. The framework for this discussion is supplied by Figure 4. A channel, monitored by a channel guardian, is supplied signals from two types of sources, those controlled by the channel exploiters and intrinsic sources over which the channel exploiters exert no control. Signals from these two sources become merged in the transmission channel and are extracted and made accessible to the channel guardian by technical processing. Up to this point all signals which have been designed to survive the processing have equal intrinsic validity and salience. All signals are equally susceptible to corruption through random processes-noise. However, in an effort to insure reception of signals from controlled sources, they may have been made unusually strong. In addition, signals from controlled sources may have subtle errors. One important function of the channel guardian is to detect such signs of tampering. These signs represent errors in the encode process.

The principal function of the channel guardian is the conversion of processed signals into a channel report or indicator. In this process the channel guardian must extract salient features from the channel output and assign them validity and meaning. In many cases,

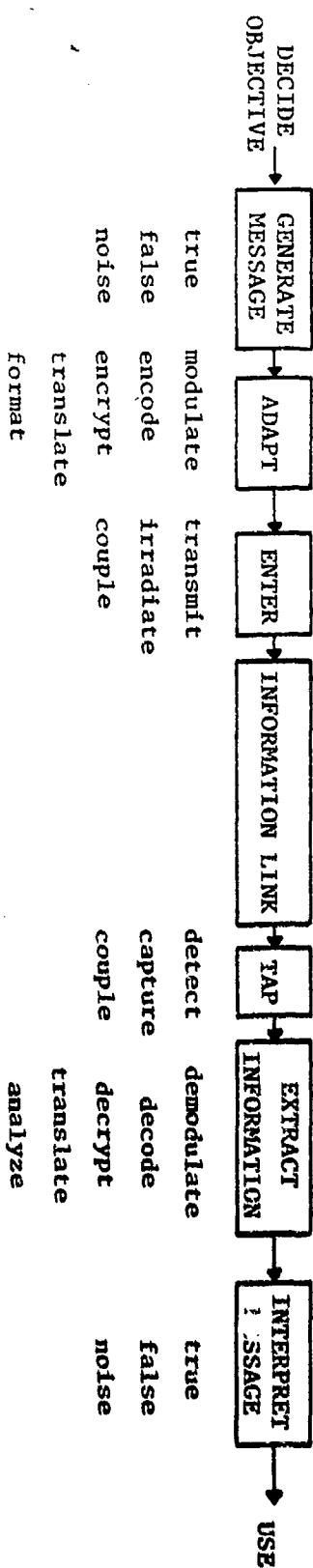


Figure 3. Information war engagement schema of T.P. Rona.

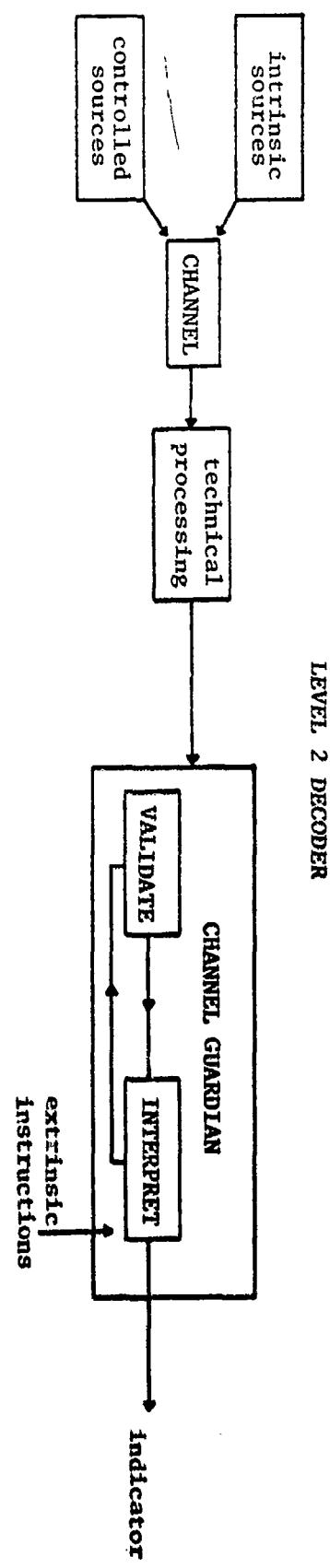


Figure 4. The generic level 2 decoding problem.

the criteria for selection and interpretation will be controlled dominantly by instruction extrinsic to the channel guardian. The channel guardian will apply additional criteria which are a consequence of his experience and training. In particular, he should expect to be alerted by any discordance between signals from intrinsic and controlled sources and by any departure of detailed features of the signals from those which his experience has led him to expect. It should be anticipated that the channel guardian will be much more sensitive to details of the indicator than to its implications. According to the approach taken here problems of validity posed by discrepancies in meaning with other indicators are a level 1 problem. This approach is suggested as a method for approaching the validity problem in a fashion which may be tractable although it is as yet an unsolved problem. In Figure 4 indicator validity is represented by a process which treats signals passing through as true, false or questionable. The functioning of this process is determined by the signals currently passing through the process, those which have previously passed through the process (in terms of signal characteristics not signal meaning) and external direction.

The task for the channel exploiter is relatively clear. First, he must have sufficient information about the technical processing so that he can generate signals which will compete with those generated by intrinsic sources. Often this will be an easy task since the opponent will actively be attempting to exploit genuine communications of the deceiving side, so the only required knowledge is the fact of exploitation. In other cases obtaining sufficient information about the technical processing (or capabilities) poses a significant challenge. Next

the exploiter must insure that the details of the indicator to be passed are similar to those normally passed over the channel and that they are not discordant with indicators from intrinsic sources. Thus, the exploiter must attend to the technical processing the signal is to receive, past signals transmitted over the channel and other signals coming over the same channel from intrinsic sources. The technical processing aspect is mandatory least the proffered indicator be exposed immediately as counterfeit (e.g., visual camouflage can be penetrated by multispectral techniques, so that knowledge of the existence of multispectral reconnaissance is essential to the camouflager). Attendance to past signals is also necessary to insure validity since the guardian can be expected to be alert to such details (i.e., he can be expected to recognize the "fist" or accent of past users of the channel). Finally attendance to indicators provided by intrinsic sources is necessary if the controlled indicator is not to be indicated by a preponderance of contrary evidence.

While embedding level 2 transactions into the communications theory construct appears relatively straightforward if the validation interpretation process can be handled in a satisfactory fashion, the same cannot be said for the level 1 process. In this process the message (the deception) is encoded into a number of specific indicators. These indicators are then transmitted via channel exploiters, who use physical signaling, to channel guardians, who form a transformed indicator set. The received indicator set is then subjected to a process of merger and analysis to extract the received message. Figure 5 provides a schematic depiction of the level 1 process. Note that multiple channels may be involved. Further note that the encoding transformation (X), but not

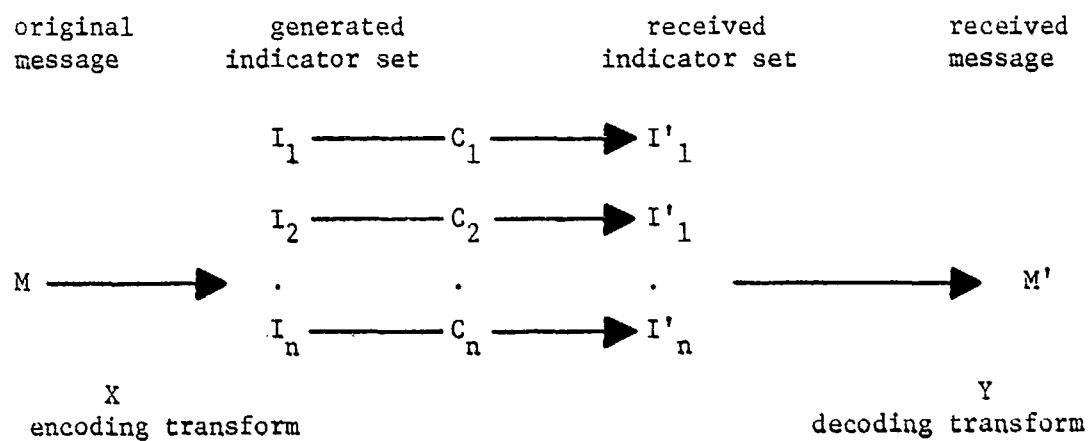


Figure 5. Schematic depiction of Level 1 transactions.

the decoding transformation (Y) is subject to control by the deceiver. In contrast to the normal communications situation, the encoding scheme must be based on predictions of, rather than, knowledge of the recipient decoding transformation (Y).

Some deceptions, which R.V. Jones describes as telephone hoaxes,⁷ do involve a single channel. In these deceptions a sequence of indicators are passed through a single channel which contains no signals from intrinsic sources to a single channel guardian who is also the target of the deception. Jones characterizes such hoaxes as particularly simple, and the development which we have undertaken allows us to clearly see the reasons for this. As only a single channel guardian is involved the validity process is unitary rather than multiple. Since all indicators passed are under the deceiver's control problems of dissonance are minimized. The problem is further simplified since the involvement of the channel guardian guarantees the continued salience of the indicator sequence to the target. Consequently, the only problem in such proto-deceptions is that of sufficiently predicting the decoding

transformation and devising an appropriate encoding transformation.

Jones uses the term sympathetic nature to describe the required ability to predict the target's decoding function. This ability allows the perpetrator of the hoax to place himself in the victim's place to see what evidence he has with which to construct and test his world picture.

As one moves from proto-deceptions such as the telephone hoax toward more complicated situations, a host of additional factors come into play. One of these is the effect of multiple information channels into the top level decoder. As information carried over additional channels is admitted into the decoding process the channel exploiter must either take steps to control these channels, which as Jones points out, greatly complicates this task, or else he must find that his freedom to exploit the channels which he controls is limited by the information deriving from intrinsic sources. However, even more troubling than the existence of known, uncontrolled channels (white channels), whose contribution to the ultimate decoding process of the channel can be anticipated and for which allowance can be made, is the possible existence of unknown channels (black channels). The possible impact of such channels cannot even be compensated by "worst case assumptions" by the encoder since the worst case is that the black channel gives the intended victim access to the innermost secrets of the deception. The target is thus in a position to turn the deception around.

Other complications which emerge as one moves away from proto-deceptions have little intrinsic relationship to information. These are organizational and bureaucratic political factors which occur within the level 1 decoding system. These factors may prevent indicators which have been successfully injected into the system from influencing

the ultimate decision in the intended fashion. It is on these types of factors which analyses such as Wohlstetter's analysis of Pearl Harbor and Handel's analysis of the Yom Kippur War⁸ focus. As has been stressed previously, although these analyses use the language of signals and noise they are using these terms in an entirely different fashion than they are used in communication theory.

By way of summary of the development of the level 1 problem to this point, a main task for the encoder is to anticipate the functioning of the decoder. The decoder process frequently represents multi-source fusion and validation, processes which are poorly understood even in relatively favorable situations. In many cases the decoder processes are further complicated by embedding them in a complex and time variable organizational and environmental context. Consequently, unless the target has stable and well characterized habits in handling and analyzing information, the encoder can have only a fuzzy prediction of the decoder process on which to base his encoding scheme.

Despite problems of reducing discord with information supplied by intrinsic sources of the possible existence of black channels and problems in anticipating the decoding process, reasonably efficient communication can still take place. The requirement for communication in this case is the existence of a feedback path from the output of the decoder to the input of the encoder. Such a feedback path allows monitoring the current functioning of the decoding system, however it may be characterized, and provides a method for detecting and correcting errors in the initial encode-decode scheme. Communications theory shows that feedback and error correction reduce the signaling rate. However, since the signaling rate for level 1 transactions is typically quite low,

considerable delays associated with feedback and error correction seem quite acceptable.

Allied deception operatives during World War II found the feedback provided by ULTRA and the tasking to controlled agents invaluable in allowing their efforts to achieve their intended goals. While the type of feedback provided by ULTRA is perhaps unique, valuable feedback was also obtained through monitoring the search for additional information by the decoding system. This observation implies that monitoring the targets of an opponent's sensor systems is potentially a valuable source of feedback.

A summary of the major propositions developed in this section is as follows:

1. Embedding deception into a communications theory framework requires a dual scheme. One level involves the generation, transmission and reception of indicators. The other level involves the encoding and decoding of the deceptive message in a sequence of indicators.
2. Communications theory, as conventionally understood, seems capable of extension to cover the indicator transmission process if the validate/interpret function of the channel guardian can be incorporated in a satisfactory manner.
3. Communications theory does not map well onto the other level of communications. However, the communications theory approach suggests that successful deceptive communications requires either the existence of stable well characterized patterns for dealing with information on the part of the deception target, or the existence of a feedback path from the output of information analysis organizations to the deception planners.

FOOTNOTES

¹ Roberta Wohlstetter, Pearl Harbor: Warning and Decision (Stanford, CA: Stanford University Press, 1962).

² Barton Whaley, Codeword Barbarossa (Cambridge, MA: MIT Press, 1973).

³ W.R. Harris, Counter Deception Planning (Rand Corporation, T9803-1-ARPA., August 1970).

⁴ J.C. Thomas Jr., A design-interpretation analysis of natural English with applications to man-computer interaction, Int. J. Man Machine Studies, 10, (1978) 651-668.

⁵ T.P. Rona, Weapons Systems and Information War (Seattle, WA: Boeing Aerospace Co., July 1976).

⁶ In later work Rona identifies channel guardians as sensor operators and the process of passing spurious signals through these operators as spoofing.

⁷ R.V. Jones, "The Theory of Practical Joking-An Elaboration," Bulletin of the Institute of Mathematics and its Applications, Vol. 11, (1975), pp.10-17.

⁸ M. Handel, "Perception, Deception and Surprise: The Case of the Yom Kippur War," Jerusalem Papers on Peace Problems, No. 19 (The Hebrew University of Jerusalem (1976).

DECEPTION IN A GAME THEORETIC FRAMEWORK

William Reese

INTRODUCTION

The theory of strategic games attempts to deal with situations in which the outcome of an interaction between two or more actors is mutually dependent upon the combined choices of the actors.¹ Consequently, it seems natural to seek insights about deception from game theory. There are two ways in which the theory of games can be applied to the problem of deception. In one way game theory is used to identify those cases susceptible to deception in representing the preferences over choices by one of the actors in a situation where it is assumed the receiving actor will accept the representation as truthful. In the second any game theory is used as a tool to examine the problem and one actor who has received a signal and is faced with deciding if the signal is direct or inverted. This context embraces the first should the target wish to consider the possibility of deception. It could also occur in a direct conflict situation in which the preference rankings were diametrically opposed. The second application of game theory in a direct conflict context will be the central focus of this discussion.

In strategic games a single choice (move) by one of the actors (players) has no intrinsic meaning since its results are dependent on the choices of others. It is the strategies which determine the choices which are important and susceptible to analysis. A strategy can be defined as a plan for choosing individual moves which is complete in the sense that no event, whether the action of opposing players or a random occurrence allowed by the game structure, is not anticipated by the plan. It is not

the individual event, but the complete strategy which can be assessed rationally. The rational judgment about the strategy of one participant required either assumptions or information about the strategies of the other participants. It is not permissible to treat the choices of the opposing players as chance events controlled by probabilities. This takes game theory beyond a simple application of probability theory. Normally, the assumption is made that the opponents will, within the limitations of the information available to them, attempt to seek the most favorable outcome which they can obtain. Given the assumption that the opponents will themselves act rationally, it frequently follows that one should act so as to deny the opponents useful information about one's own strategy.

A central result of the theory of strategic games is that favorable strategies frequently involve making choices based on a random event chosen from a suitable distribution. The role of random choice is to thwart one's opponents from deducing one's strategy and developing a counter-strategy which exploits any weakness which might be evident were one's strategy known. The role of the suitable distribution is to optimize the long term expected outcome from the game (game's value). The distribution is developed from the principle that one should adopt a strategy which will, at worst, yield a known and acceptable result even if the opponent is able to deduce the strategy behind one's choices. An example of these ideas is provided by the game of matching pennies. Game theory shows that no method of choosing is better than the process of "flipping" the coin which results in a random selection of the two choices (head or tails) in which each choice is expected to occur half the time. If this strategy is chosen the expected outcome is to break even.

Strategies based upon random choice are called mixed strategies. A

mixed strategy implies that on some plays the player may expose himself to a greater degree of risk than normal. This risk is compensated by avoiding the greater risk that one's choices will become predictable and hence exploitable. The role of the risky choice in the game is the same as the role of bluffing in the game of poker. As was observed in the seminal work of game theory.²:

Of the two possible motives for bluffing, the first is the desire to give a (false) impression of strength in (real) weakness; the second is the desire to give an impression of weakness in (real) strength. Both are instances of inverted signaling. . . i.e., of misleading the opponent. It should be observed, however, that the first type of bluffing is most successful when it "succeeds," i.e., when the opponent actually "passes," since this secures the desired gain; while the second is most successful when it "fails" i.e., when the opponent "sees" since this will convey to him the desired confusing information.

The lesson of game theory that one should sometimes bluff in order to confuse the opposition can be transferred to other contexts. For example, McDonald³ notes:

Political strategists often attempt to explain everything that a powerful nation says in the UN or does on the political scene in terms solely of a definite strategical pattern which it is assumed can be discovered by fitting all the pieces together. Such analysis fails to account for the possibility that some political moves may be made on a random basis just in order to throw the opposition off the scent. A "rational" political leader, according to game theory, ought to make such random moves.

In some games, only a single choice is rationally indicated so random bluffing is not "rational." In such cases, the indicated choice is called dominant. A dominant choice insures an outcome at least as favorable as is obtainable by any other choice and, for some choices by the opponent will yield results which are more favorable than would be otherwise possible. An application of game theory to deception involving influencing the opponent's choices requires implying dominant choices when

none exist. Brams⁴ has performed analysis of two actors, two choice (2X2) games to deduce those most susceptible to deception. Brams' analysis is most applicable to negotiation, whether explicit or not, and assumes that the two parties exchange information about their rankings about the possible outcomes and act upon the exchanged information. The target does not consider that the opponent may engage in inverted signaling. Brams finds that games in which both players have dominant choices are deception proof since the choice which each player would rationally make is unaffected by the choice of the other. In other games one or both parties, by misrepresenting his preference ranking to make it appear that a dominant choice existed when none did, might induce a choice by the opposing party which could be exploited. In some cases the fact of deception would be revealed by exploitation. In other cases the deception would be obscured since the exploiting choice would be the one indicated by the falsely signaled dominant choice. (This situation occurs when the deceiver be faced by an unattractive choice.)

As stated in the opening paragraph, the type of analysis which Brams conducted is not directly applicable to the situation in which a player wished to decide if a signal which has been received is direct or inverted. A typical example might occur in a direct conflict situation in which the preference orders of the participants are diametrically opposed and the problem is to choose, given some signal which seems to indicate the opponent's probable choice. If the signal may be inverted, deception must be considered. The framework used to examine this problem will be games of direct conflict, zero sum games.

A zero game is one in which the winnings of one participant come directly at the expense of the other participants. As an example of viewing;

deception in the context of a zero sum game, consider the situation of the Purple commander in the illustration used to focus the discussion of communications theory. The Purple commander receives the message "Green tanks are massing on Eastside." Given that he has insufficient resources to guard both sides, game theory cautions him not to fail between two stools and split his forces for he would then face certain defeat. Should he choose to act on this information, he has two possible options: assume the signal is valid and prepare for an attack on Eastside or assume the signal is inverted and do the opposite. His problem is then this: if he chooses correctly, he faces a possible gain, if he chooses incorrectly, he faces disaster (with Green benefiting). What is appropriate strategy for the Purple commander to adopt? We will return to this question after introducing a few technical details about two person, zero sum games.

TWO PERSON ZERO SUM GAMES

The simplest model of a direct conflict game is a zero sum game involving two sides. In such a game structure one side can make one of n choices and the other side can make one of m choices, with the outcome being that one side "wins" and the other side loses an amount U_{ij} (corresponding to the two sides making the i th and j th choices respectively). For the purpose of the discussion, we assume that the two sides have common views of the worth of any particular outcome (the values U_{ij}). The game is thus characterized as one of complete information.

Of all two person zero sum games, the simplest are those in which each side has two choices. Such games are called 2X2 games. These games can be represented by four element payoff matrix corresponding to the values U_{ij} (taken as viewed by one of the parties - as viewed from the

other side, the payoff matrix differs by each entry having the opposite sign.) As an example, consider the game of matching pennies. Calling the two sides A and B, the possible outcomes of a particular play in which A and B independently call "heads" or "tails" are:

A and B both choose heads-A wins

A and B both choose tails-A wins

One calls heads, the other tails-B wins.

If winning (or loosing) represents the exchange of the penny, then from A's point of view the payoff matrix can be represented as

		B		(B's choices are indicated here)
		H	T	
A	H	1	-1	
	T	-1	1	

The first question which must be answered is "What is the best strategy for A (or B)?" The theory of games insures that for this game, as is the case for all two person, zero sum games, there exists a best strategy in the sense of mini-max.⁵ The mini-max criterion insures that even if one player knows beforehand the strategy which governs the choice of his opponent, he still cannot reduce the average payoff over many repetitions (the game value) below the value obtained by mini-max. Thus, if a player uses a mini-max strategy, he can do no worse than a predetermined amount and he can sometimes do better if his opponent does not play correctly. The potential for additional profit from an opponent who plays poorly is dependent on the pay-off matrix which characterizes the game. For the game considered here this potential does not exist. For other games it does. To profit from an opponent's poor play in a game such as this, one

must also play "poorly" (e.g. according to a less rational strategy than mini-max).

The methods for finding the mini-max strategy for 2x2 sum games are well known.⁶ For the case at hand, matching pennies, the proper strategy is a mixed strategy in which A (for B because of the symmetry of the game) chooses heads half the time and tails half the time with the choice being made randomly each play. The reason for the random choice in the prescribed strategy is to insure that the opponent cannot guess the next choice since it is not determined beforehand. If correct play is made in this game, then the wins balance the losses and the value of this (fair) game is zero.

Introduction of deception into this game would be for A (or B) to announce prior to a move, "Next move I am going to choose heads (or tails)." The problem would be, how should the other side act? Should he "believe" and exploit the prior information? Should he "disbelieve" and attempt the trap the suspected deceiver? We shall perform this analysis for a more general game in the next section, but for this particular game, the answer is that the "best" strategy is to ignore the prior call unless it could be confidently established that the other player departed from good strategy by adopting an other than random strategy for deciding when to lie. Analysis of the game with potential deception instructs the player who makes a prior announcement to lie half the time, with the occasions chosen at random.

TWO PERSON, ZERO SUM GAMES INVOLVING DECEPTION

Let us return to the problem of the Purple commander as a vehicle for exploiting two person, zero sum games as a framework for the analysis of deception. Upon receiving the message, "Green tanks are massing on East-side," he has the following choices:

Assume the message is direct and prepare for a defense on Eastside,
 or
 Assume the message is inverted and prepare an ambush on Westside.

In matrix form, his choices his opponet's choices (send a direct or inverted signal) and the consequences can be represented as:

		G	D	I
		P		
D'	value of best defense		penalty of planned surprises	
I'	penalty of unplanned surprise		value of ambush	

where D and I imply direct and indirect signaling by Green and D' and I' imply assumptions of direct and indirect signaling made by Purple commander in setting his plans.

To proceed further actual values have to be assigned to the outcomes. Although we will later simplify the values and the analysis, let us at present assign:

A is the value to Purple of best defense.

-B is the value to Purple of Green achieving an unanticipated surprise.

-B-Δ is the value to Purple of Green achieving an anticipated surprise.

A+Δ' is the value to Purple of an ambush of Green.

The symbols have been chosen so that all (with the possible exception of Δ) are positive numbers. Further, it is expected that B, B+Δ and Δ' are all considerably larger than A. (This exception is based on historical data on the value of surprise in battles.⁷) Using these symbols, the payoff matrix used by the Purple commander becomes:

		G	D	I
		P		
D'		A		-B-Δ
I'		-B		A+Δ'

The mini-max solution to the game can be obtained using standard methods. The recommended strategies for both G and P are mixed. The Purple commander should make his choices with the following probabilities:

$$P(D') = \frac{A + B + \Delta'}{2A + 2B + \Delta + \Delta'}, \quad P = \frac{A + B + \Delta}{2A + 2B + \Delta + \Delta'},$$

while the Green commander can be expected to play randomly according to the following probabilities:

$$P(D) = \frac{A + B + \Delta + \Delta'}{2A + 2B + \Delta + \Delta}, \quad P(I) = \frac{A + B}{2A + 2B + \Delta + \Delta'}$$

These recondite formulae can most easily be interpreted if some simplifications are introduced. The easiest simplification is to assume a single value of surprise, i.e.,

$$B = B + \Delta = A + \Delta' = sA,$$

The parameter S can be called the value of surprise and represents how much more effective an operation will be if surprise is achieved than if it is not achieved. A likely physical value for S would be the expected "exchange ratio" from the resulting combat. With a single value for surprise the probabilities for P and G become identical. For P the probabilities are:

$$P(D') = \frac{2S}{1 + 3S}, \quad P(I') = \frac{1 + S}{1 + 3S}$$

Historical data suggests that s might be between about 3 and 5, so that G (and P) ought to play the direct option about 60% of the time. That is for this case G should not engage in deception the majority of the time. The game is indeed unfair to P, having a value to him of $-0.6A$ for $s=3$ and $-1.58A$ for $s=5$. This shows the importance of G sometimes using inverted signaling. If P could discount this possibility, the value of the game would be A in favor of P. Thus, the occasional practice of deception, despite the risks, converts G from a loser (on average) to a winner (on average). The probabilities associated with direct and inverted signaling result from finding a rational balance between the reward of surprise and the risk of being ambushed.

Another special case comes when a higher value is assigned surprise obtained in an ambush than when achieved in other ways, i.e.,

$$B=B + \Delta = sA \text{ and } A + \Delta' = asA.$$

In this case, the probabilities for P (and G) take the form

$$P(D') = \frac{(1+a)s}{1+(2+a)s} \text{ and } P(I') = \frac{1+s}{1+(2+a)s}$$

If we examine the case $s=3$ and $a=2$, inverted signaling should occur in just $4/13$ of the cases (down from $4/10$ when $a=1$) and the value to P becomes $-1/7$. Thus, as the value of ambush increases G is forced to lie less (for fear of ambush) and the game becomes more favorable to P.

The same game allows a quantitative impression to be gained about the value of feedback to the deceiver. Starting with the base case of the single value of surprise game represented by the matrix,

		G	D	I
		P		
D'	P	1	-s	
	I'	-s	s	

The mini-max solutions has value for P of

$$\frac{-s(s-1)}{3s+1} .$$

If feedback is represented as converting the "ambush" into a "best defense" (and it will probably be even less favorable than this to P), then the matrix with feedback becomes

G	D	I
P		
D'	1	-s
I'	-s	1

which has value for P of

$$\frac{-s-1}{2}$$

That is, the value of the game with feedback to G is $(3s+1)/2s$ times the value of the same game without feedback. (The advantage is even more if $s > 1$.) For $s=3$, the feedback game is $5/3$ as valuable to G as is the basic game without feedback. This increase in value comes because G is free to lie more often. For the feedback game, the mini-max strategy instructs G to engage in inverted signaling exactly half the time. Thus, the existence of feedback removes the penalty of ambush and promotes deceptive signaling.

As we have already observed, the "game" which confronts the commander faced with the possibility of deception is normally "unfair" against him. One way of increasing the fairness is to increase the penalty to the deceiving side if it is found out, i.e., by increasing the value of "ambush." Another way of reducing the "unfairness" is to allow another, realistic option--delaying the choice until more information is available. The benefit of the wait choice is obvious--if the situation clarifies in time, surprise can be avoided. The hazard of the wait choice is equally

obvious--if the situation does not clarify in time to take proper action, surprise by the opponent is guaranteed. The problem to which we will now turn is, "under what circumstances and to what extent should the commander "wait" rather than commit himself?"

As a framework for this analysis, let us extend the now familiar single surprise game by introducing a third choice for P. The choice, which is to wait until the situation is clarified, will be modeled as follows: there is a probability p that the correct situation will be perceived in time to take the correct action (best defense or ambush) and a corresponding probability $1-p$ that the situation will become apparent too late, in which case the penalty of surprise is imposed. With this model for the wait choice, the extended game can then be represented by the payoff matrix.

P		G	
		D	I
D'	1	-s	
	I'	-s	s
W	$p(1+s)-s$	$(2p-1)s$	

Although obtaining the solution for the extended game is more tedious than for the original game, a mini-max, mixed strategy none the less exists. The analysis shows that if the probability of timely discovery is less than $1/2$, P should never wait (the probability of surprise is too high). When p is small, rather than waiting, the Purple commander should immediately commit himself according to the results of the original game. When the probability of timely discovery is greater than $1/2$, the Purple commander should not take action assuming inverted signaling but adopt a mixed strategy which is a mixture of D' and W strongly biased toward W. This does not preclude Purple from attempting to set an ambush (i.e., choose I') at a later time should the situation clarify and indicate this to be

the proper action or if a reassessment of the probability of timely discovery implies waiting is no longer prudent. What this result implies is that at the time of choice the Purple commander should either play D or W.

An interesting, and apparently paradoxical, feature of the extended game is that as the probability of timely discovery grows larger, Purple should wait less and assume direct signaling more often. This superficially strange result occurs since a large value of p , which by assumption is simultaneously the value assumed by P and the value credited to P by G, forces G to abandon inverted signaling since the risk of being ambushed is unacceptably high.

In a more quantitative vein, the mini-max strategy for the extended game is as follows:

$$p < 1/2 \quad P_p(D') = P_G(D) = 2s/(1+3s), \quad P_p(I') = P_G(I) = (1+s)/(1+3s), \quad P_p(W) = 0$$

with value to P = $-s(s-1)/(1+3s)$;

$$p > 1/2 \quad P_p(D') = p(s-1)/(1+s + ps-p), \quad P_p(I') = 0, \quad P_p(W) = (1+s)/(1+s+ps-p),$$

$$P_G(D) = 2ps/(1+s + ps-p), \quad P_G(I) = (1+s)(1-p)/(1+s+ps-p)$$

with value to P = $(2ps-s(1+s)(1-p))/(1+s+ps-p)$.

These formidable formulae can be made more transparent if some indicators are examined graphically. Three useful indicators are the probability of waiting, the probability of inverted signaling ($P_G(I)$) and the value of the game to the target P. These three quantities are shown in Fig. 6 for the special case $s = 3$, which is a quite typical case. When the probability of timely discovery exceeds about 0.7 this game becomes favorable to P in the sense that the waiting option has sufficient probability of timely discovery that P will be a winner average. Larger values of

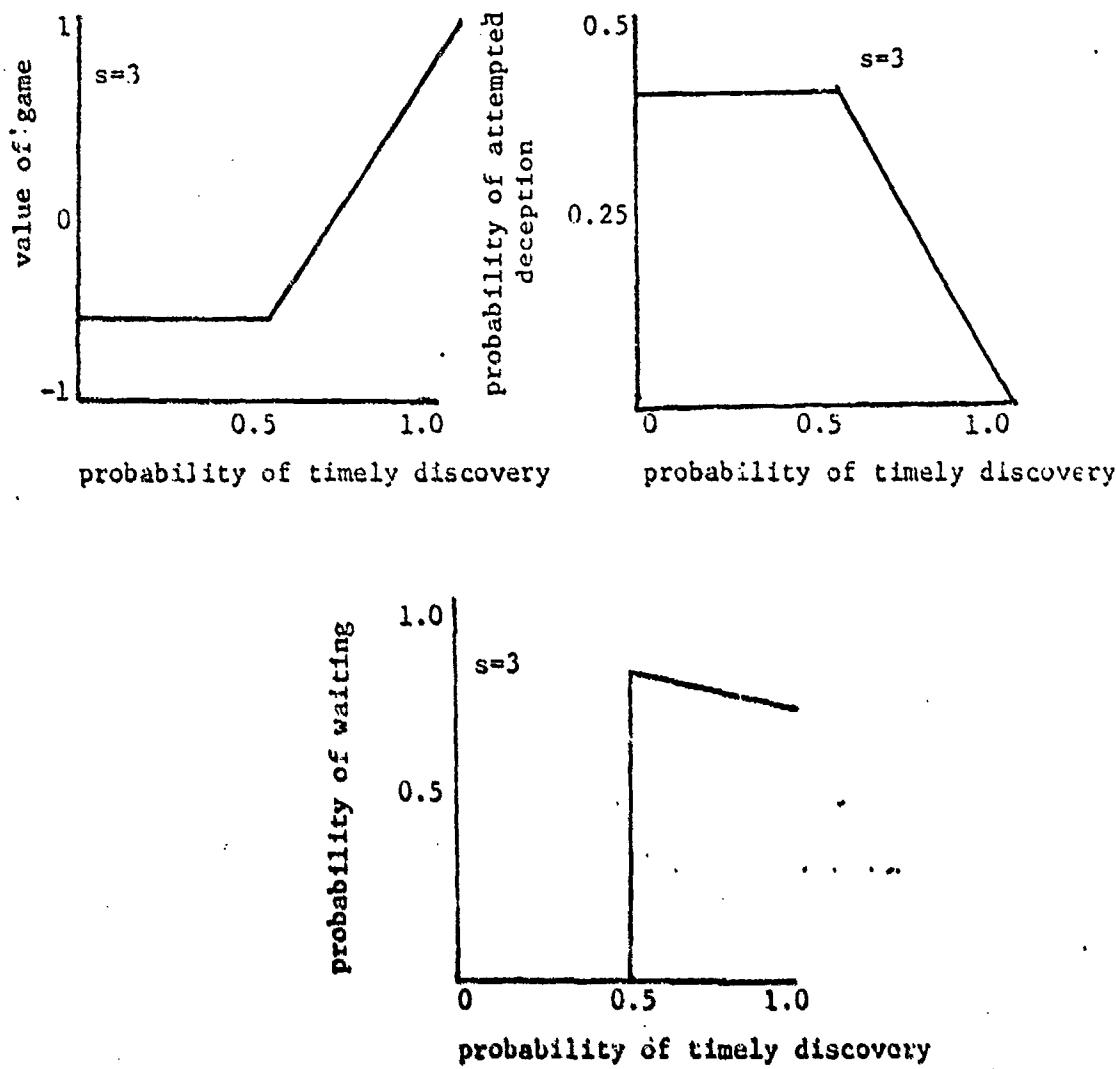


Fig. 6. Key indicators for extended game according to mini-max strategy as a function of the probability of timely discovery for the case $s=3$.

surprise (s) would require larger values of timely discovery before the game would become favorable to P.

Although the exact behavior which characterizes the solution near $p = 1/2$ is somewhat an artifact of the particular payoff matrix chosen to represent the game, the general behavior should persist over quite a range of similarly structured situations. That is, for low values of timely discovery the choice should be made between D' and I' (an unfair game) while for higher values of p , a strong preference develops for W with the residual choice being D'. This suggests that if the signaling party intends to employ inverted signaling, he should take measures to reduce the probability of timely discovery by the opponent. One classic means of doing this is to reduce the time available for discovery. If the deception must have long life, then either a technique must be developed to prevent the opponent from discovery, i.e., tight security or satisfying the opponent that he has the correct picture or else reliable feedback must be established to avoid the consequences of being ambushed.

The model just considered provides one strong clue about the almost uncanny success of tactical deception. The model implies that the perception of the target of his ability to clarify the situation in time is an important variable. If the assumed probability is greater than 1/2, the rational strategy is normally to wait. This suggests a very strong tendency of the target side to "wait" if it feels that it has substantial likelihood of timely discovery of the true situation. It would seem that misestimation of the likelihood of the situation clarifying would be an attractive error. Having too much faith in either possessing enough time or resources to clarify a muddled picture seems an almost certain lure to surprise since the choice which must be made in the absence of

clarification is unattractive as one is placed on the losing end of an unfair game.

FOOTNOTES

¹Two useful, popular treatments of strategic games are John D. McDonald, Strategy in Poker, Business and War (N.Y.: W. W. Norton, 1950) and J. D. Williams, The Complete Strategyst (N.Y.: McGraw Hill, 1966).

²J. von Neuman and O. Morgenstern Theory of Games and Economic Behavior (2nd ed.; Princeton, N. J.: Princeton University Press, 1947), p. 189.

³McDonald, Strategy, p. 115.

⁴S.J. Brams, "Deception in 2X2 Games" (unpublished manuscript, N.Y. University, July, 1975).

⁵J. von Neuman, "Zur Theorie der Gesellschaftsspiele" Math. Annalen, 100 (1928), 295-320.

⁶J. von Neuman and O. Morgenstern, Theory of Games, sections 17, 18; J. D. Williams, The Complete Strategyst.

⁷B. Whaley, Strategem, Deception and Surprise in War (MIT, unpublished manuscript, 1969).

A SYSTEM MODEL FOR DECEPTION

Paul H. Moose

INTRODUCTION

The systems view¹ holds that a phenomenon such as deception in military/political affairs should be analyzed in an appropriate contextual framework; isolating deception from other systemic functions only creates an artificial concept, one with no counterpart in reality. Further, it requires that the phenomenon be bounded, i.e. that we have a means to decide what variables must be explicitly included in the system model. We do this by stating the following general premises.

Deceptions may occur by intention or by accident. We shall consider only the former. Deceptions are carried out by a Deceiver's overt actions, or sequence of actions, directed against a Target. In communications terminology,² these actions are viewed as signals; the signals are designed to a) confuse or b) mislead the Target about the Deceiver's true situation or intentions, or even a third party's situation or intentions. The probability that a confusion creating signal or set of signals actually creates confusion depends on the Target's tolerance for ambiguity. The Target's tolerance will be a function of his goals and objectives and of his perception of the situation. The probability that a misleading type signal will be believed depends a) on the target's assessment of the credibility of the channel thru which it has been received, b) on its congruence or lack of congruence with his existing perception of the situation, c) on the action or sequence of actions that may be implied by believing the signal and d) on the impact these implied actions will have on his goals and objectives.

Finally, we postulate that success or failure of a deception must not be measured by whether or not the Target believes, or is confused by, the signals, nor even by his actions, but it must be measured by its effects on subsequent observable events. Though perhaps a harsh test of utility, the system view holds that anything less is to be neglected as inconsequential. The function of a system model is to provide a program for predicting future events and, allegedly, assessing the relevance of deception.

THE MODEL

The above premises lead us to imbed deception in the overall stream of events describing the evolution of relationship between two sides. This event stream is imagined as arising from the actions of Side A in response to a stimulus set consisting of the previous actions of Side B plus other environmental stimuli. In turn, Side A's actions along with other environmental stimuli become the stimulus set that determine Side B's next actions, etc. The mode is depicted in its most elementary form in Figure 1. It is important to note that with three entities, Side A, Side B and the Environment, there are six couplings to determine. In considering military/political deception, the Environment includes other countries or military forces not directly involved in the A-B conflict, such as Allies, neutral nations, etc. It may encompass public and world opinion, political factors, and other social components as well as natural environmental phenomena. In short, the Environment accounts for all other factors and factions that may be affected by or may affect in anyway A and B's actions.

We can envision events as being generated by the dynamic interplay of the three entities A, B, and E. The sequence of events is called an

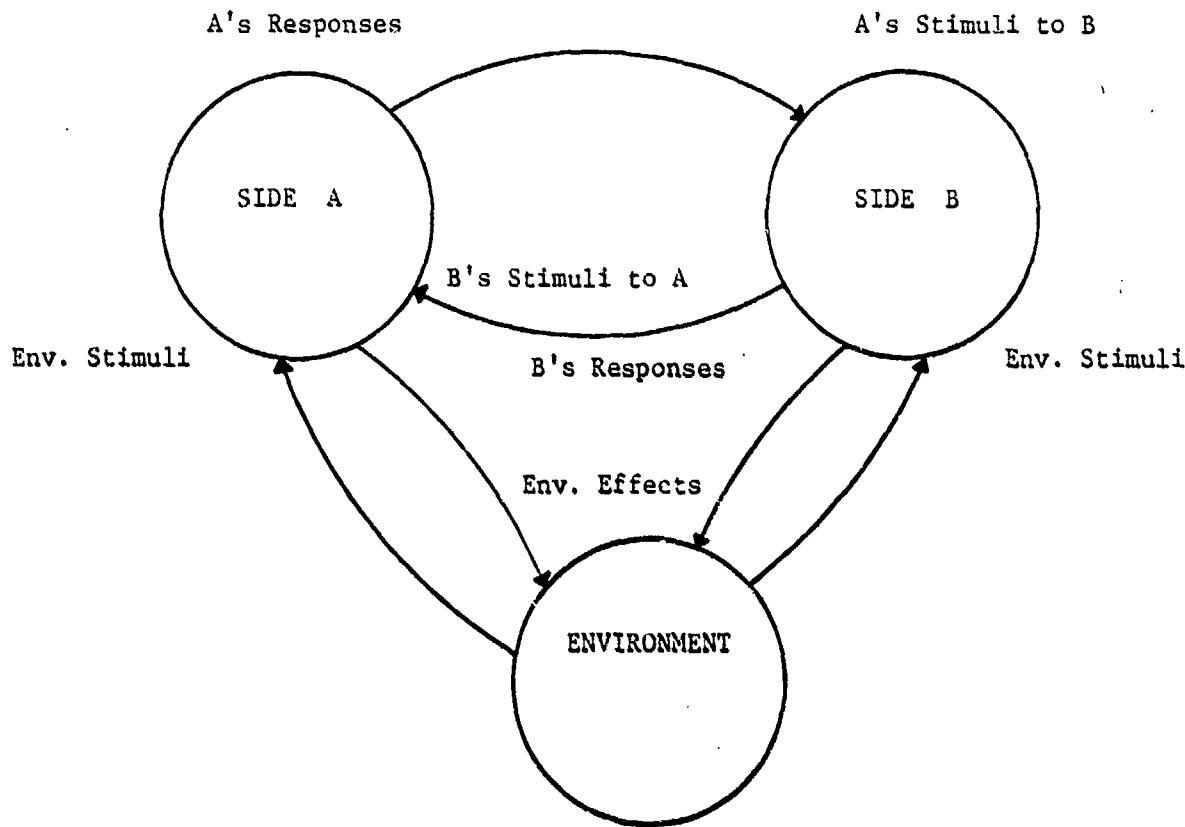


Figure 1

Elementary System Model

event stream and the instantaneous situation, that is, the state of affairs at any point in time, is the cumulative result, the integrated effect, of the event stream from $t = -\infty$ up until the present. An event stream (just showing interplay between A & B) is depicted in Figure 2. Here, it is clear that reactions are caused by actions. Our view is a teleological one. Events of a military/political nature, do not just occur. They are the direct results of individuals and/or group behavior.³

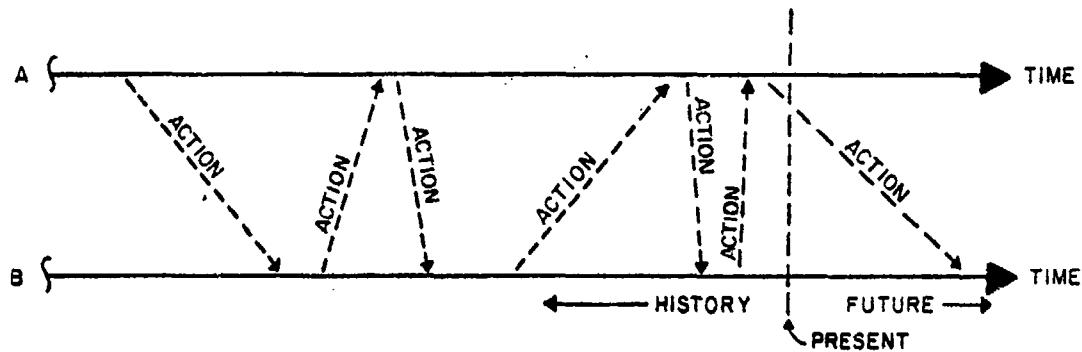


Figure 2

Event Stream

ON THE NATURE OF BEHAVIOR

Human behavior lies at the core of deception phenomena. To understand how to deceive, or why deceptions work, we must develop means to account for human behavior in our analyses. The Social Sciences have no composite and consistent theory that "explains" behavior or that can predict behavior unerringly. Yet psychology has established a great deal about the nature of human behavior. A number of the psychological dimensions of behavior relating to deception have been outlined by Sarbin.⁴

The systems theorists must have a way to operationalize these observations. This is accomplished by adopting the following point of view. Behavior consists of two parts: a predictable part and an unpredictable or random part. The predictable part is a function of three factors: 1) a set of intrinsic properties or features of the organism, 2) conditioning through integration of the event stream from the time of the origination of the organism up to the present, and 3) goal-seeking, i.e., efforts of the organism to achieve a set of goals. The unpredictable part of behavior arises from 1) incomplete knowledge of any of the three factors cited above or 2) purely random and unaccountable events such

as natural catastrophe.

The questions for us are: 1) to what extent can A predict B's future behavior and 2) to what extent can he influence B's future behavior through the stimulus sequence?

SYSTEM VARIABLES

We have already talked about stimulus sets and response or action sets. The responses, or actions of A become events that establish a new situation which stimulates B, etc. This is a "feedback" or "cybernetic" system model. One's actions return, transformed by the oppositions' reactions, to stimulate one to new actions, and so on.

In the case of military affairs (as is true for all organisms involving humans), actions are of the two types: physical or energetic actions and informational or communicative actions. Thus, a decision by A to declare war may first manifest itself as a message from Side A to Side B, "We declare war on you," or by a physical attack of A's forces upon B. Decision makers deal primarily with informational variables.

The nature of an organization is such that many informational (as well as energetic) variables will be transmitted to the other side and thus will act as stimuli. These transmissions will be intentional, as in, "We declare war on you" or unintentional, as when material concerning military plans accidentally appears in a newspaper, or is obtained through covert intelligence channels. In addition to this leakage of information, the actual force activities that occur can deviate substantially from those ordered due to reinterpretation of orders as they pass down the chains of command. Consequently the situation that develops which actually stimulates the other side may 1) not be what intended and 2) not be

completely known to the decision maker. Furthermore, it is obvious that A may only be partly aware of environmental stimuli to B. The combination of these factors lead to considerable uncertainty about the other side's stimulus set and accordingly, prediction of behavior becomes much more uncertain.

A further complication arises because systemic stimuli almost never pass directly to the decision makers. Various stimuli pass through various intermediate levels of analysis, validation, summarizing, etc. This is unavoidable in large organizations because of the sheer quantity of stimuli and the number of persons involved in its processing. Nevertheless, the effect is that stimuli, in passing through these "internal" channels, will be modified even further. Some important information may be discarded, either by accident or for bureaucratic reasons, and other information may be incorrectly expanded based on uncertain suppositions. The net effect is that Side A's uncertainty about the inputs to Side B's decision maker increases even further. In fact, since B is probably only sensing A's force stimuli indirectly, thru combat reports, A may not be able to assume that B knows the true battle situation.

Thus, although our model is one of cause and effect, it exhibits a considerable amount of unpredictable or random behavior. The growth of uncertainty is unavoidable and may be thought of as a characteristic of the "channels of communications" between A and B and between A and E and B and E.

FEEDBACK

One of A's objectives is to predict B's behavior and, by suitable stimuli, to control it. The more certain A is of the channels of communication to B, the better he will do. Since there is great intrinsic

randomness in these channels, both internal and external, A needs some way to reduce his uncertainty. There are two ways to do this. Consider the diagram of Figure 3. One way is for A to wait and see what B's

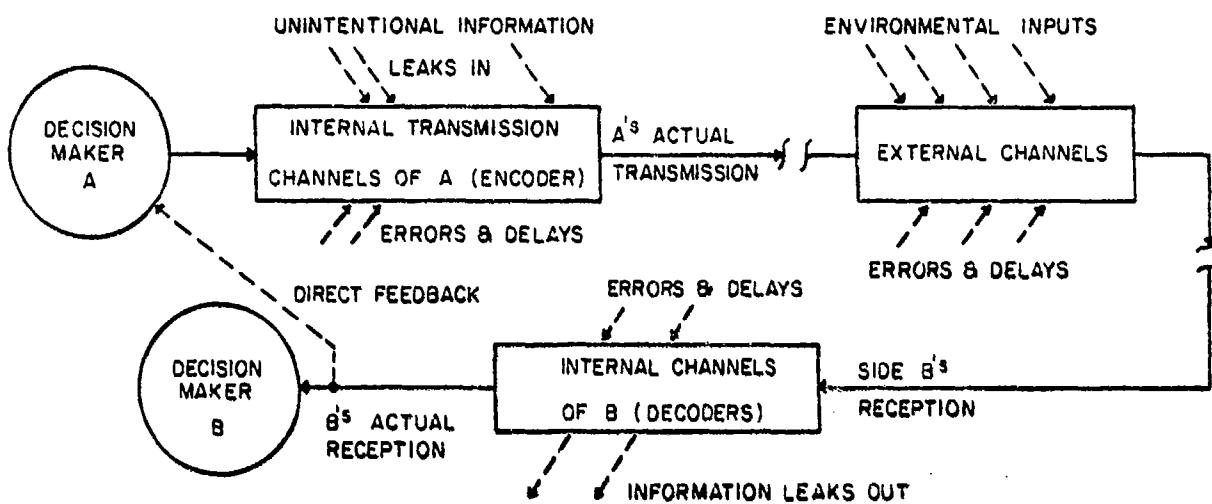


Figure 3
Components of the Communications
Channel from A to B (Channel from
B to A, not shown, contains similar components)

response is to a particular action by A. The action may even be "designed" to elicit a particular type of behavior. Based on this response, and his knowledge of B's intrinsic behavior, A can deduce what the actual stimuli must have been. This is a well known and useful technique.

In communications theory this technique is known as "probing the channel." It has, however, some obvious limitations. We recall that A's picture of B's response must pass through the return channel (not shown explicitly in Figure 3, but just the mirror image of the forward channel). Thus A cannot measure B's actual response, only his response transformed

by the channel from B to A. This is not as serious a limitation as it might seem if we argue that B's actual response is of no value to A anyhow because A's actions must always hinge on his perception of B's response. So, in attempting to characterize the communication channels for future deceptive use, A can only expect to act on what he will be able to perceive about B's behavior, not B's actual behavior.

A greater problem with this "learning approach to channel characterization" lies with the dynamics of the Environment, the dynamics of the channels themselves and with the high degree of uncertainty introduced by apparently random behavior in the channels. The theory of measurement tells us that the greater these uncertainties, the more probes are required to characterize the channels. But because of natural delays in the system, the more probes required, the more time required. If the internal or external channels or Environment alter their properties during times characteristically shorter than the time required for measurement, it will not be possible to characterize the channels in this fashion. Another way of saying this is that the system properties must be stationary for long periods, enough to average out random variations, in order to determine normal trends. It must be remembered that even if this is possible to do, predicting any particular sequence of events will still be subject to random error. However, by knowing the normal or expected system behavior, this error, i.e. the uncertainty in the future event stream, can be greatly reduced.

We have here one of the primary system theoretical results. In times of peace, or prolonged conflict, system characteristics will be sufficiently stable that one can learn to predict behavior with a fair degree of certainty either with intentional probes or by simply extrapolating from

past sections of the naturally occurring event stream. During such periods, the system is in equilibrium; it is exhibiting "steady state" behavior. The period of the Cold War is an example of such an epoch. However, during periods of transition, such as crisis, or when one military force is gaining a significant advantage vis-a-vis another, the system is unstable. Attempting to probe the channels to measure their properties will not be successful because they are changing too rapidly. Furthermore, knowledge of the organism's intrinsic properties may become faulty at such times. An old organism may be dying and a new one being given birth. Such is the case during revolutions.

The ordinary feedback that is a part of the natural interplay between two sides is one way to estimate the normal trends of the channels of communications and of the opposing side's decision maker in order to be able to better predict his future behavior. Another type of feedback, purely informational in nature, is a direct feedback channel from Side B's decision maker to Side A's decision maker. By "direct" we mean a channel that is relatively free of delay, error and environmental influences (see Figure 3). ULTRA is a good example of such a channel. Foreign agents operating at high levels represent another example. These "intelligence channels" are normally established by A's initiative and without B's cooperation or knowledge. The purpose of direct feedback is to short circuit one or the other or both of the normal channels in order to reduce uncertainty, eliminate delay, and permit more accurate prediction of the other side's behavior. It becomes particularly useful when systems are in transition, or as we shall see, when one wishes to deceive the other side at relatively frequent intervals.

GOAL SEEKING

In addition to the integrated effects of past stimuli and certain intrinsic properties, an organism's behavior is a function of its goals. One component, or element, of the "goal set" is always organism survival.⁵ For some organisms, viability is their only real goal. In military/political organisms, however, there are other goals imposed from without. In general, the goal set of such a system will be very complex and it too will be dynamic, i.e., it will change with time and situation. Nevertheless, one can better predict the behavior of one's opponent in direct relationship to certainty of the opponent's goal set.

For example, if A knows B is greatly concerned about maintaining status quo, he can predict with some certainty that B will select among his possible courses of action the one that will appear to assure status quo for the greatest possible period of time. Thus, if a deceptive stimulus is designed to cause B to postpone force action in order to "gather more data about the situation," then A can be quite certain B will accept this deception and A can mount a surprise attack on B with great impunity. Almost any deception will work, either one that confuses B, so he has a rationale for searching for information to alleviate his confusion, or a deception that misleads B into thinking that A also intends to try to maintain status quo. Thus it was simple matter for Hitler to deceive Chamberlain because the Prime Minister wanted it to be true, even though it was more or less obvious to the whole world that Hitler was lying.

We have as a primary principle that a Deceiver intent on misleading a Target should stimulate actions on the part of the Target that are congruent with the Target's goals to the greatest possible degree. By congruent we mean they support at least one of the elements of the set with

little or no risk of setback to any others.

If the Deceiver's objective is only to confuse the Target, that is, increase his uncertainty about the true situation, the Deceiver must consider the Target's tolerance for ambiguity. The general issue is to understand for how long and to what degree an organism can remain ambiguous about his perception of reality. We postulate that it resolves ambiguity at the point it perceives that the risks of waiting outweigh the risks associated with immediate action. These "risks" must be assessed in terms of the decision making element's goals, not those of subordinate or supporting elements. For example, in spite of a variety of intelligence analyses indicating that the Japanese could attack the Pacific Fleet and achieve surprise in 1941, there certainly was more than enough ambiguity about whether they actually would to make it problematic at best. Roosevelt is reported to have said after having moved the Fleet from the West Coast to Pearl Harbor in 1940 in order to threaten the Japanese expansionism, that ". . . when I don't know where to move I stay put."⁶ On the other hand, Khrushchev withdrew the missiles from Cuba, although still somewhat ambiguous about Kennedy's resolve to attack Cuba, when he came to feel the risk of waiting substantially outweighed the risk (loss of face) of withdrawal.

We conclude that a deception that confuses or creates ambiguity in the Target may or may not buy the Deceiver time. The Target will resolve (in his own mind) the ambiguity and act immediately if he believes waiting risks greater loss than action. Resolution will be based on "good judgment," that is conditioning from the cumulative stimuli of the event stream, and on the current set of actions available to deal with the given situation. However, if the Target's main goal is to preserve

status quo, he will almost always see more risks in acting "prematurely" than in waiting to get a "clearer picture" of his opponent's intentions.

DECEPTIVE METHODS

Now with this dynamic system model in mind, consider what methods may be employed to deceive a Target. It is clear that the Deceiver must consider carefully the sequence of future events he envisions unfolding. That is, he must look beyond the "first move" to the actions the Target is most likely to take and what, in turn, his own reactions must be in order to gain the advantage he seeks.

Furthermore, the deception itself may take a number of cycles to unfold. It may require establishing special channels, including a direct feedback channel, and a means to measure the reliability of those channels. It most certainly requires a determination of the Targets' goals, and probably requires their prediction for the time period the Deceiver will utilize in capitalizing on the lie or confusion he has perpetrated. Finally, the Deceiver wants to understand to the greatest possible extent the intrinsic properties of the Target system, how it transforms stimulus sets into actions and how it resolves ambiguity.

Given this understanding and capability, the Deceiver should design the lie or lies, whether they aim to reinforce the Target's perception of the situation or aim at changing it, to require actions congruent with the Target's goals. He should use channels of communication that a) the Target believes to be credible and b) are reasonably connected to the decision making element(s) of the Target system.

In order to assure the reliability of these channels, the Deceiver will have to transmit many "True" messages for every "False" message.

We can formalize this requirement somewhat as follows: Assume that the probability a message is transmitted correctly over the channel from A to B is p . Then $q = 1-p$ is the normal error rate in the channel. If r is the fraction of deceptive messages transmitted, then for $r < q$, the probability that the Target will unmask the deception is very small. It is "buried in the normal noise" of the channel. However, note that the fraction of messages that can be successfully transmitted as deception is

$$r' = pr \leq pq$$

which has its maximum value at $p = q = 1/2$. A channel that has the property $p = q = 1/2$ is a "maximum entropy" channel; it is maximally uncertain. If $p > q$, the channel is very reliable but one is not permitted many opportunities to deceive if he does not wish to give himself away. A channel where $q > p$ has so much noise that it is consistently unreliable, and though many deceptive signals can be transmitted, they will probably fall on deaf ears.

Also note that only 50% of deceptions attempted will be correctly received over the maximum entropy channel, and the Deceiver is maximally uncertain about whether his Target has been deceived or not. This state of affairs will probably be unsatisfactory to the Deceiver so he must arrange to reduce his uncertainty with a high quality, i.e. low error rate, low delay, direct feedback channel. In this way a Deceiver can attempt to perpetrate a fairly large number of lies, assuming a large fraction will be rejected, and still know with considerable certainty which have been accepted and are acting to stimulate the opposing decision maker, thereby affecting his behavior in the desired way. We conclude that establishing a direct feedback channel is a prerequisite if one wants to practice deception on a regular basis. If one only wishes to deceive on rare occasion,

he can transmit the lie over a highly reliable channel, if one exists, and be quite certain it will stimulate the desired behavior in the Target.

UNMASKING DECEPTIONS

The most effective way to prevent deception is to be continuously aware of one's vulnerabilities as a Target. One should maintain great skepticism about signals from the opposition that encourage procrastination or inactivity. One should attempt to exploit the "leaky" nature of the opposition's internal communications. But most importantly, one should attempt to unmask deception by the use of counterdeception. One can do this either by initiating preliminary activities indicating the lie has been believed or that it has been rejected. What is necessary is establishment of a direct feedback channel from the original or suspected Deceiver's decision making elements to the suspected Target, in order to determine if the counteractivities have been successfully transmitted through the return channel. Once again, the Counter-Deceiver must anticipate expected behavior from the Deceiver, his Target, be it further attempts to reinforce the original lie or be it initiation of the actions planned to capitalize on a lie believed. In either case, he must have a counterdeception plan that hypothesizes two measurably different near term event streams, depending on whether a deception is present or not. The evidence to support one hypothesis or the other will come through both reliable and unreliable channels and it must be combined in a proper mathematical fashion if the two hypotheses are to be differentiated in an unbiased fashion. Throughout the counterdeception period, the Target must continually assess his risks of waiting vis-a-vis those of action from accepting one or the other hypotheses as true. The risks will vary with

the certainty with which one or the other is held true, and at some point a threshold will be crossed where the Target's risk of waiting outweighs that of acting on the most probable hypothesis. At this point, the deception, if present, has either been unmasked or not, but the ambiguity has been removed: a "true state" upon which the Target will act has been established.

CONCLUSION

We have proposed that deceptions must be analyzed in their contextual framework and that that framework includes interactions not only between the two sides but between both parties and their Environment(s). This is the general system theoretical viewpoint. But it appears to render historical analyses of deception exceedingly difficult. This is not to say that considerable insight will not be derived from case studies of past military affairs suspected or known to contain attempts at deception, but only to point out that it may be exceedingly difficult to measure the effect of the deception on subsequent events.

The advantage to be derived from adopting a systems point of view of deception is that it focuses players on the problem of predicting the future event stream. This is more likely to assure that a Deceiver has devised a set of actions to capitalize on the advantage he has gained. It is more likely to force a Target to consider deception as a possibility in the interpretation of evidence and to evaluate the potential consequences on his cause.

We have also seen that ambiguity causing signals may or may not defer decision making by the Target. If the Target perceives substantial risk in waiting for more data, he may act immediately, perhaps even before he

would in the absence of the confusion producing signals. However, if
... Target's main goal is to maintain the status quo, confusion producing
signals will almost always stimulate procrastination.

Finally, we have seen that if one wishes to transmit misleading type
deceptions, he should keep their frequency below that of the normal error
rate in the channel. In this way he can be fairly certain to not be dis-
covered lying. Thus, one can use very reliable channels of communication
to deceive only on very rare occasions.

FOOTNOTES

¹See, e.g., F.E. Emery, Systems Thinking (N.Y.: Penguin Books, 1969), p. 281.

²William Reese, "Deceptions within a Communication Theory Framework," unpublished paper, (1980).

³Sarbin refers in his notes to the "behavior stream," Sarbin, "Some Psychological Dimensions of Deception," unpublished paper, (1980).

⁴Sarbin, "Some Psychological Dimensions."

⁵"Organism" is the general systems theory term for any living system including groups, organizations and societies. See, e.g., James G. Miller, Theory of Living Systems (N.Y.: John Wiley, 1979), p. 34.

⁶Roberta Wohlstetter, Pearl Harbor: Warning and Decision (Stanford: Stanford University Press, 1962), p. 82.

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SUPPLEMENTARY

INFORMATION

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A.D. A086194

Memorandum

DATE: 4 March 1981

FROM: Dudley Knox Library (Code 0142), Naval Postgraduate School, Monterey, CA 93940

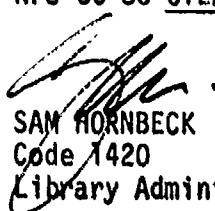
TO: Administrator (DTIC-DDA-1/Mr. Jim Cundiff), Defense Technical Information Center, Cameron Station, Alexandria, VA 22314

SUBJ: Naval Postgraduate School Document, Change of NPS Control Number

Ref: (a) AD A086194. Multidisciplinary Perspectives on Military Deception, by Donald C. Daniel, Katherine L. Herbig, and others. Naval Postgraduate School Technical Report No. NPS 56-80-012. Final Report for Period January 1979 - October 1979. May 1980.

Jim:

Just to let you know that the "NPS" control number on the referenced report has been changed from NPS 56-80-012 to NPS 56-80-012A.


SAM HORNBECK
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